IDENTIFYING THE BENEFITS OF KNOWLEDGE MANAGEMENT IN THE DEPARTMENT OF DEFENSE: A DELPHI STUDY

THESIS

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ABSTRACT

Knowledge Management (KM) has been identified as one of several enablers of the current Transformation effort in the Department of Defense. Several organizations within the DoD have started using KM and are now interested in identifying and, subsequently, measuring the benefits in order to gauge success. While many studies have been undertaken to identify the benefits of KM in the commercial sector, similar efforts to investigate the benefits in a DoD context are lacking. Using a Delphi study involving key DoD KM experts, this research aims to identify the major realized benefits associated with KM practice from a strictly DoD perspective.

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David P. Sasser

TABLE OF CONTENTS

Page

Page

Page

LIST OF FIGURES

LIST OF TABLES

Table Page

IDENTIFYING THE BENEFITS OF KNOWLEDGE MANAGEMENT IN THE DEPARTMENT OF DEFENSE: A DELPHI STUDY

I. INTRODUCTION

Background

The U.S. Department of Defense (DoD) is currently undergoing a transformation which aims to revolutionize the way it fights wars and conducts business. This transformation is "the process whereby the DoD is overhauling the U.S. military and defense establishment to enable it to counter 21st century threats most effectively. Transformation is about new ways of thinking, fighting, and organizing the Department and its operations - as well as about acquiring new system capabilities" (Defense Link, 2003). Several organizations across the DoD are already beginning to identify the application of knowledge management (KM) as a key strategic focus in order to affect this transformation (Bartczak, 2002; Cuviello & Michaliga, 2003).

Knowledge management is "the attempt to recognize what is essentially a human asset buried in the minds of individuals, and leverage it into an organizational asset that can be accessed and used by a broader set of individuals on whose decisions the firm depends" (Davenport & Prusak, 1998). The ultimate goal of KM is to take advantage of this knowledge asset in order to provide some level of benefit to the organization (Davenport & Prusak, 1998; Nonaka, 1996). However, many in both the military and civilian information resource management communities believe that KM provides

nothing beyond what is already accomplished with information management, and is simply "old wine in a new bottle" (McAdam & McCreedy, 1999; Spiegler, 2000). Consequently, leaders and managers would like proof that KM works, and identifying and measuring the benefits of KM is recognized as a key issue for future KM research (Edwards, Handzic, Carlsson, & Nissen, 2003; Firestone & McElroy, 2003).

Given that serious resources are already being committed to KM in the DoD, it follows that identifying the benefits derived from KM from a DoD perspective is highly desirable. Indeed, Bartczak (2002) as well as Bennet and Porter (2003) found that demonstrating a return on investment regarding KM initiatives in the DoD is necessary in order to gain and keep leadership support as well as garner funding commitments. Certainly this would require an ability to measure the benefit such initiatives provide. However, this task cannot be addressed until an initial identification of such benefits has been accomplished. While a preliminary literature review identified several studies which attempted to quantify the benefits of KM from a commercial perspective, no similar research taking a strictly DoD perspective was identified.

Research Questions

1) What does the literature identify as the key benefits of KM programs in general?
2) What do DoD KM experts identify as the key benefits associated with KM in the DoD?
3) Do DoD KM experts experience problems measuring KM benefits? If so, how?

Research Approach

A Delphi study will be conducted consisting of two questionnaires distributed to several knowledge management experts across the DoD. Experts will be identified as those currently overseeing knowledge management initiatives in their respective organizations, and having at least two years of experience working with knowledge management in general. The Delphi study will be used to identify the degree to which DoD KM experts agree that KM benefits identified in commercial organizations apply as benefits to the DoD.

Benefits/Implications of Research

Given the amount of time and money the DoD is investing in knowledge management initiatives, a method of quantifying and measuring the benefits that result from these investments is highly desirable. Academics have identified a strong need for research regarding this subject, and a preliminary literature review did indeed uncover attempts to identify KM benefits from a commercial perspective. However, nothing identifying the applicability of these benefits to the DoD was found. The results of this research could be used as a first step to thoroughly identify KM benefits to the DoD, and ultimately a process for measuring and calculating a return on investment of DoD KM initiatives.

Thesis Overview

The remainder of this document will report the efforts to address the research questions presented in this chapter. In chapter II, the literature from scholars that serves as the theoretical foundations of this work will be reviewed. Specifically, a general review of KM will be provided, followed by a review of KM applications in the DoD, the benefits of KM identified thus far, and a discussion regarding the difficulties of measuring KM performance. Chapter III presents the research methodology used in this study, while chapter IV sets forth a detailed analysis of the collected data and the findings that resulted from this analysis. Finally, the thesis closes with conclusions and recommendations.

II. LITERATURE REVIEW

The Knowledge Society

Peter Drucker (1993) argues that our world as we know it has very recently undergone a shift from an information to a knowledge society. His idea is that knowledge has become *the* resource driving our economy. The ability to apply knowledge in order to improve processes, or even generate new knowledge, is what determines a successful company today. Just as the laborer was the key enabler during the industrial revolution, the "knowledge worker" has become the key enabler in this new knowledge society.

Several other leading business authors share the views of Drucker. Toffler (1990) sees the primary source of power in today's world shifting from might and wealth towards knowledge. This shift in the nature of power will drive countries and companies to scramble for control of new knowledge resources. Reich (1991) argues that today's economy is global and knows no borders. Thus, competitive advantage can only be gained by those who can use knowledge to identify, solve, and broker new problems. Quinn (1992) states simply that, "Intellect is the core resource in producing and delivering service." Finally, Thomas Stewart believes that, "knowledge has become the preeminent economic resource – more important than raw material; more important, often, than money" (Stewart, 1997).

Knowledge

If we are to believe that the focus of success in today's world is squarely upon gaining and leveraging knowledge, then it is probably in our best interest to attach some meaning to the term. This is quite a bit more difficult than it sounds, however, as a great many definitions exist throughout the body of literature. Some examples found during this literature review include:

- Knowledge is actionable information that is possessed in the mind (Nonaka & Takeuchi, 1995).
- …knowledge is information effective in action, information focused on results (Drucker, 1993).
- Knowledge is the experience, concepts, values, or beliefs that increases an individual's capability to take effective action (Alavi & Leidner, 1999).
- Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms (Davenport & Prusak, 1998).
- Knowledge is a dynamic human process of justifying personal belief toward the "truth" (Nonaka, 1996).

- Knowledge is the process of knowing, a reflexive process that takes data and information, in a social context … and generates new data, information, and/or knowledge (Spiegler, 2000).

Although it is difficult to come up with a concise statement regarding knowledge, several common themes can certainly be identified throughout the literature when referring to organizational knowledge:

1. Knowledge creation is a decidedly human-centric process. In a strict sense, knowledge can be created only by individuals (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995).
2. Knowledge is inextricably linked to both data and information. While the majority of knowledge management scholars see knowledge as the final stage in an evolution that turns data into information into knowledge (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995), Tuomi (2000) actually prefers a reverse hierarchy, posing that knowledge must first exist before information and data can be generated.
3. If something is to be considered knowledge, it must have the capacity to be acted upon (Alavi & Leidner, 1999; Drucker, 1993).

Further complicating matters is the idea that knowledge can be categorized into two separate types. The first is tacit knowledge, which is personal in nature and

generally hard to formalize and communicate. It exists most readily in the human mind (Polanyi, 1966). An example of tacit knowledge would be a baseball pitcher understanding exactly how to throw a curveball for a strike on a warm sunny day as opposed to a cold rainy day. While the basic technique for throwing the ball can indeed be imparted upon another, the distinct difference between what will result in a strike on a sunny as opposed to rainy day is almost impossible to explain. It is something that cannot easily be transferred or communicated through written or oral means, and is most likely understood only through repeated experience.

The second category is explicit knowledge, which can also be referred to as "codified" knowledge. Knowledge becomes codified when it has been recorded somehow, whether written down on paper or embodied in an artifact of some sort. Explicit knowledge is easily communicated through formalized language (Polanyi, 1966). When an individual understands a particular bit of tacit knowledge well enough to articulate it to another, explicit knowledge is being transferred.

Knowledge Management

If today's organizations should focus on gaining and leveraging knowledge, it follows that there is an interest in managing its generation as well as preservation within the organization. This leads to the next step of this literature review, which is directed toward the practice of knowledge management. Finding a single definition for the term proved to be as elusive as searching for a definition of knowledge. The following are examples of knowledge management definitions from some top researchers in the field:

- Management of organizational knowledge for creating business value and generating a competitive advantage (Tiwana, 2000).
- Knowledge management can be viewed as turning data (raw material) into information (finished goods) into knowledge (actionable finished goods) (Kanter, 1999).
- [knowledge management is]…finding and growing intellectual capital, storing it, selling it, sharing it… (Stewart, 1997)
- Knowledge management includes not only the acquisition, accumulation, and utilization of *existing* knowledge, but also the creation of *new* knowledge (Nonaka & Takeuchi, 1995).

Davenport and Prusak provide a definition that ties together common themes from the previous definitions:

> "Knowledge management is the attempt to recognize what is essentially a human asset buried in the minds of individuals, and leverage it into an organizational asset that can be accessed and used by a broader set of individuals on whose decisions the firm depends" (Davenport & Prusak, 1998).

Indeed, the goal of knowledge management is to share the knowledge that is contained within the minds of the individual, and make it available to the entire organization. Ultimately this should lead to better decisions, which can lead to greater organizational success.

The initial difficulty with managing knowledge is identifying how the process differs in any way from information management. In fact, some organizations still think of knowledge and information management as one and the same (Spiegler, 2000). Knowledge management is unique, however, in that it requires us to somehow capture, store, and disseminate something that by it's very nature resides in a person's mind (Alavi & Leidner, 1999). This is what makes the practice of knowledge management such a challenge, though several technologies are available to assist in the effort.

Some of the most common technologies that support organizational knowledge management include knowledge repositories, knowledge maps, and expert systems. Knowledge repositories are basically large databases containing structured, explicit knowledge, usually in document form. Probably the best example of a knowledge repository, which is also most likely the largest, is the internet (Davenport & Prusak, 1998). Using the internet, individuals can access vast amounts of knowledge contained in repositories spread across the entire globe.

Knowledge maps can be thought of as a repository of another form. Rather than containing explicit knowledge itself, however, knowledge maps direct the user to a specific individual or individuals who possesses the desired knowledge. In a sense, knowledge maps do just what the name implies; they assist a user in locating those who

possesses knowledge. This technology readily facilitates the transfer of tacit knowledge, since often a higher level of knowledge transfer can take place via personal communication (Nonaka & Takeuchi, 1995).

Expert systems are a different sort of knowledge management technology, in that they aim to emulate the application of expert knowledge toward a particular process. For example, McDonnell Douglas once developed an expert system that aimed to scan an aircraft approaching the runway for landing in order to determine if it was positioned properly. This is something that experienced ground crews could do at a glance. However, it took McDonnell Douglas two years to develop a system that was 80 to 85 percent as accurate as a two second human glance (Davenport & Prusak, 1998). This highlights a shortcoming of expert systems, which is that it's extremely difficult, if not impossible, to develop a machine that can replace fundamentally human thinking processes. Thus, the input and participation of organizational members seems to remain an essential component in the knowledge management process.

Technology- vs. People-Based KM

Recognizing that knowledge management required more than just the latest and greatest technology led to the identification of two major KM process areas. In addition to "technology-based" processes, which were discussed above, Sveiby (1997) has identified the notion of "people-based" processes. Since a key component of knowledge management involves knowledge generation, which in turn is dependent upon human interaction, it became clear that a focus on appropriate personnel management techniques

was as important, if not more so, than the technologies themselves. In other words, "…effective knowledge management cannot take place without extensive behavioral, cultural, and organizational change" (Davenport & Prusak, 1998). This notion has led to a new role for managers in an organization. No longer may they only be considered managers of personnel, but managers of knowledge as well. In fact, according to Drucker, "supplying knowledge to find out how existing knowledge can best be applied to produce results is, in effect, what we mean by management" (Drucker, 1993). He goes on to state that the definition of a manager is, "one who is responsible for the application and performance of knowledge."

Knowledge Management in the DoD

Knowledge Management is still a relatively new concept in today's Department of Defense, and each service is approaching it independently (Defense, 2000). Many DoD organizations have managed to implement several technical KM solutions, while a few are working toward institutionalizing a more far-reaching enterprise-wide knowledge strategy. United States Joint Forces Command's (USJFCOM) "Knowledge Today" is considered the roots of KM for the DoD (DoD/CIO, 2001). This system is essentially a knowledge repository which allows the capture, maintenance, and sharing of knowledge throughout the command.

Both the Army and the Navy have taken big steps to not only implement several knowledge management technologies, but also incorporate enterprise-level KM strategies. Army Knowledge Online (AKO) is perhaps the most visible result of the

Army's strong focus on KM initiatives. AKO began as an information-only website, but has since expanded into a knowledge portal and collaboration platform for the entire Army (http://www.ako.army.mil) (Bartczak, 2002). AKO is one of several knowledge strategies the Army has implemented on the road its transformation into a knowledge-based organization (Bower, 2001).

The Navy has also fielded a web portal known as Navy Knowledge Online (NKO) (http://www.nko.navy.mil), as well as the Navy Marine Corps Portal. Like the Army, the Navy has worked hard to develop an enterprise-wide knowledge strategy, with a goal of transforming the Navy into a "knowledge-centric organization" (Crupi, Hedges, Passen, Thornton, & White, 2001).

The Air Force, on the other hand, has not taken such lengthy steps toward adopting an enterprise knowledge strategy (Bartczak, 2002). However, the current Air Force Information Strategy (2002) does indeed identify a goal to "…implement knowledge management practices and technologies to assure knowledge is identified, captured, and shared." Perhaps the most tangible evidence of the Air Force's adoption of knowledge management is the Air Force's version of a knowledge portal known as Air Force Knowledge Now (AFKN) (https://afkm.wpafb.af.mil). Unlike the Army and Navy portals, AFKN is only accessible from a .mil domain.

While a focus on an enterprise-wide knowledge strategy may not be universal, it is clear that at a minimum several knowledge management technologies are being implemented across the DoD.

Benefits of Knowledge Management

It would make no sense to implement KM if there were no associated benefits. Initial KM research, however, identifies numerous positive outcomes for organizations practicing knowledge management. Initial reports on the benefits of KM were largely in the form of case studies, with perhaps the most widely reported benefits being an increase in productivity as well as a decrease in costs (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995). For example, Hoffmann-LaRoche, a Swiss pharmaceutical firm, credits a knowledge management initiative in 1993-1994 with saving them $1 million per day. The firm implemented a system which reduced the application time for new FDA drug approvals by several months (Davenport & Prusak, 1998). Similarly, Hewlett-Packard used a KM system to streamline their customer support process, reducing call times by two-thirds and cutting the cost per call by 50 percent (Davenport & Prusak, 1998).

Another strongly reported benefit of KM is the acceleration of internal processes. Knowledge shared both within and between organizations ultimately results in the creation of new knowledge to help drive the organization forward (Nonaka & Takeuchi, 1995). Matsushita was able to develop the first automatic bread maker at an accelerated pace because of a KM process which enabled employees to make first hand observations of a master bread-maker at work (Nonaka & Takeuchi, 1995).

More recently, as the KM field has grown and matured, a number of quantitative studies emerged attempting to define a list of benefits related to KM. In a 1999 report, KPMG Consulting surveyed 423 organizations across the UK, mainland Europe, and the US regarding several knowledge management issues, including benefits achieved through

KM (KPMG Consulting, 1999). After identifying each organization's expected benefits through the use of KM, the respondents reported the actual realized benefits. The top four benefits included better decision making, faster response to key business issues, better customer handling, and improved employee skills. Figure 2.1 provides a snapshot of the expected benefits, while Figure 2.2 outlines the entire list of realized benefits.

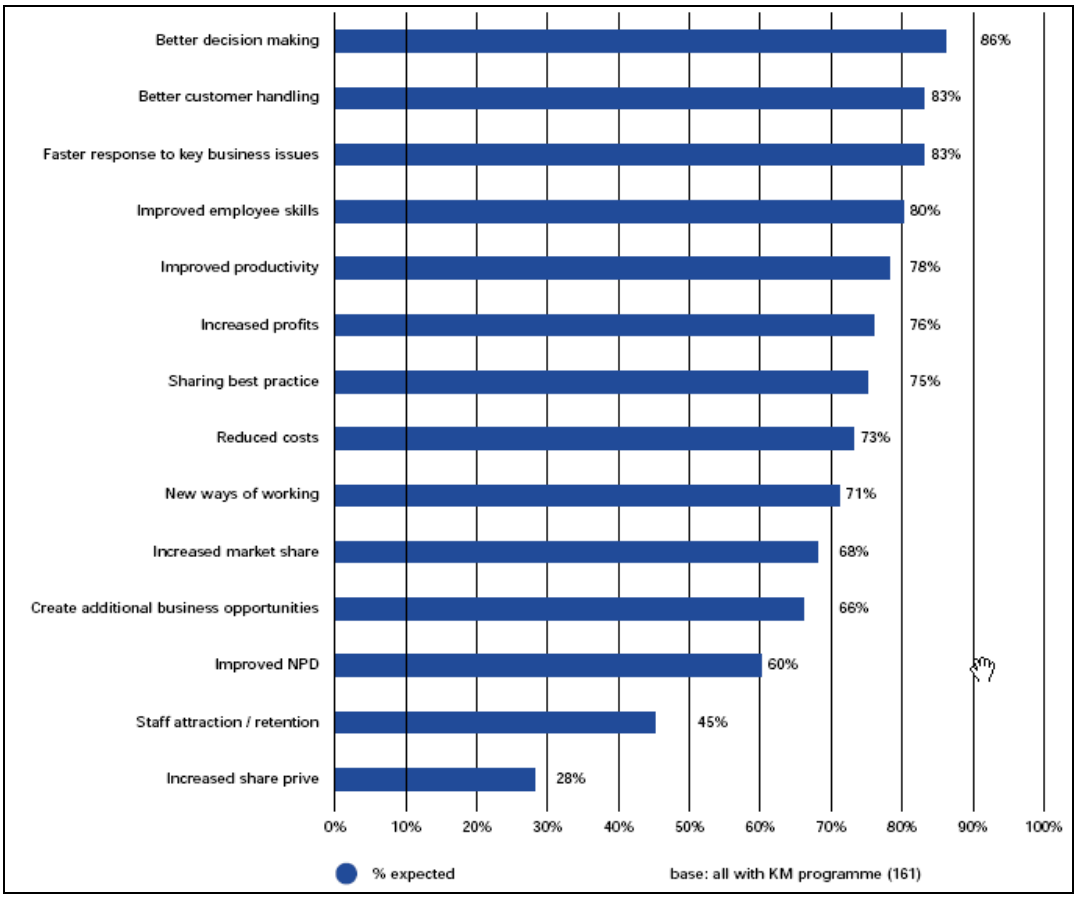


Figure 2.1 – Expected KM benefits (KPMG Consulting, 1999)

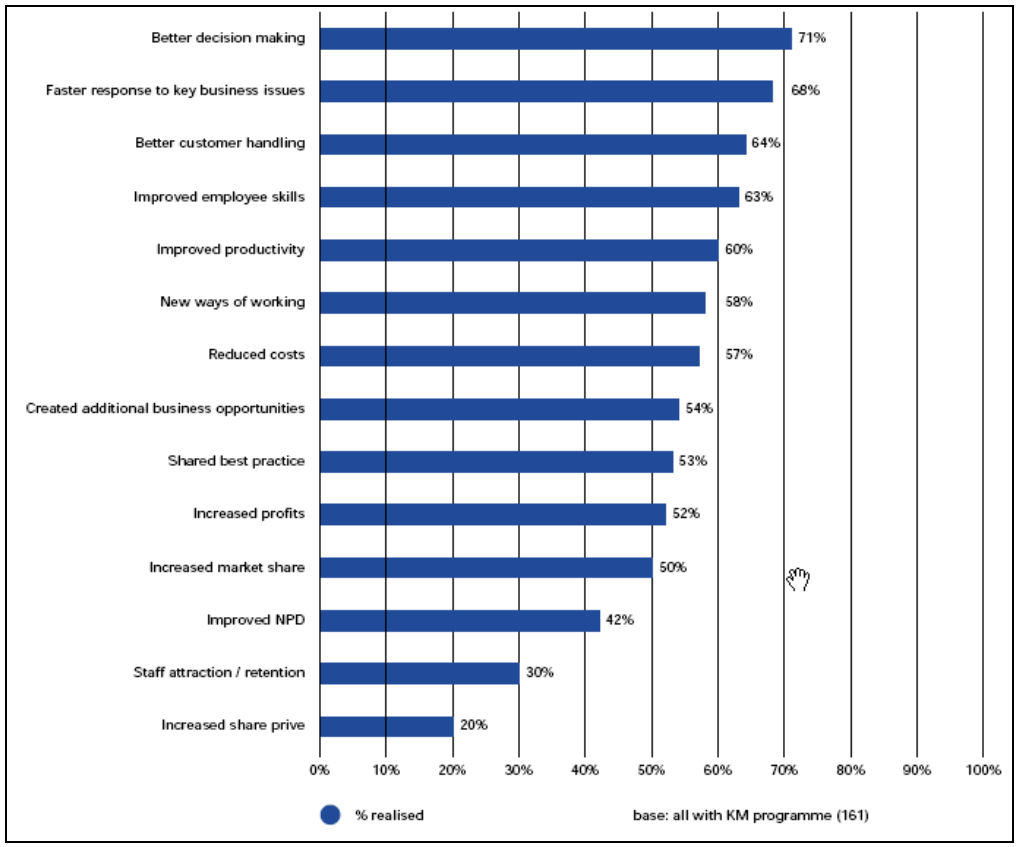


Figure 2.2 – Realized benefits of KM (KPMG Consulting, 1999)

A recent study by North and Hornung (2003) investigated KM benefits reported by 34 German companies who qualified to compete for the German Commerzbank "Knowledge Manager 2002" award. Participating companies were divided into three categories: small firms with less than 50 employees, medium-sized firms with no more than 250 employees, and large firms with more than 250 employees. A primary focus of the application was identifying KM benefits for employees, customers, and the organization itself. Benefits were based upon a balanced scorecard approach with four categories: business processes, employee satisfaction, customer satisfaction, and financial results. Figures 2.3 – 2.6 outline the number of firms reporting the respective benefits.

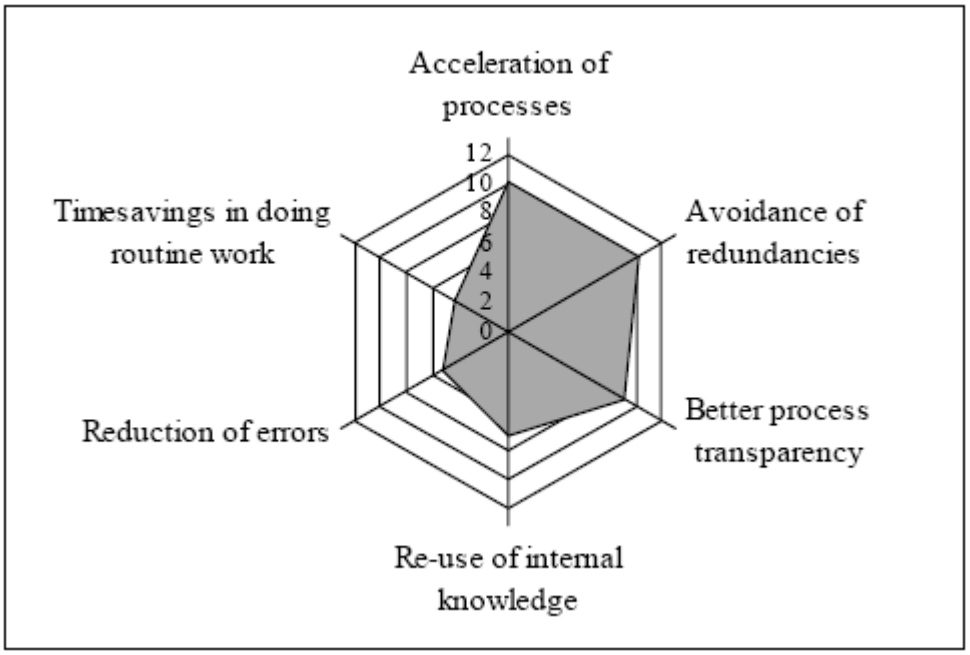


Figure 2.3 – Number of firms reporting a benefit in the area of business processes (North & Hornung, 2003)

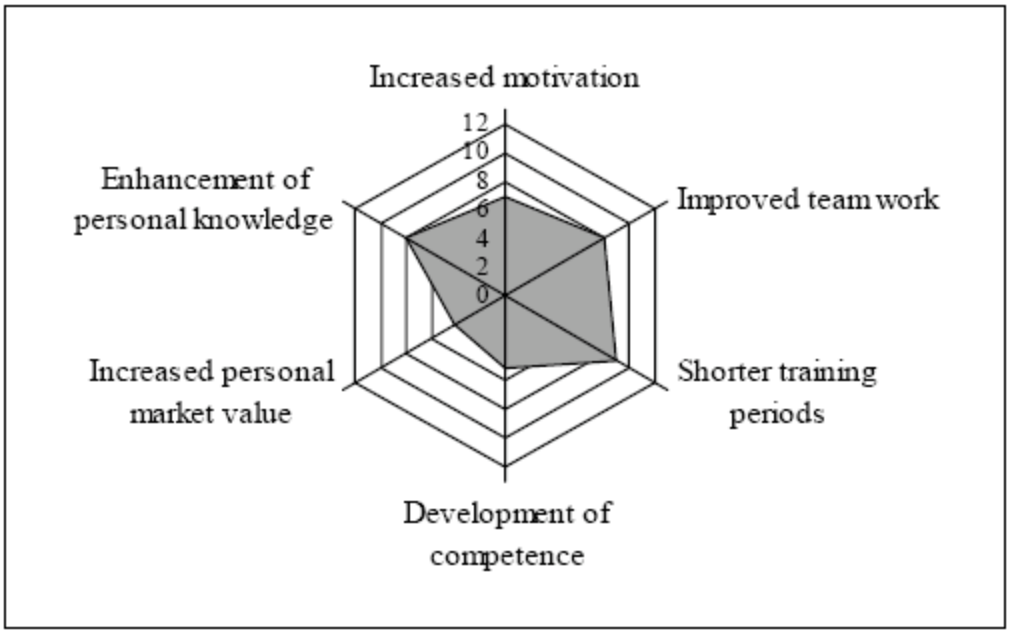


Figure 2.4 – Number of firms reporting a benefit in the area of employee satisfaction (North & Hornung, 2003)

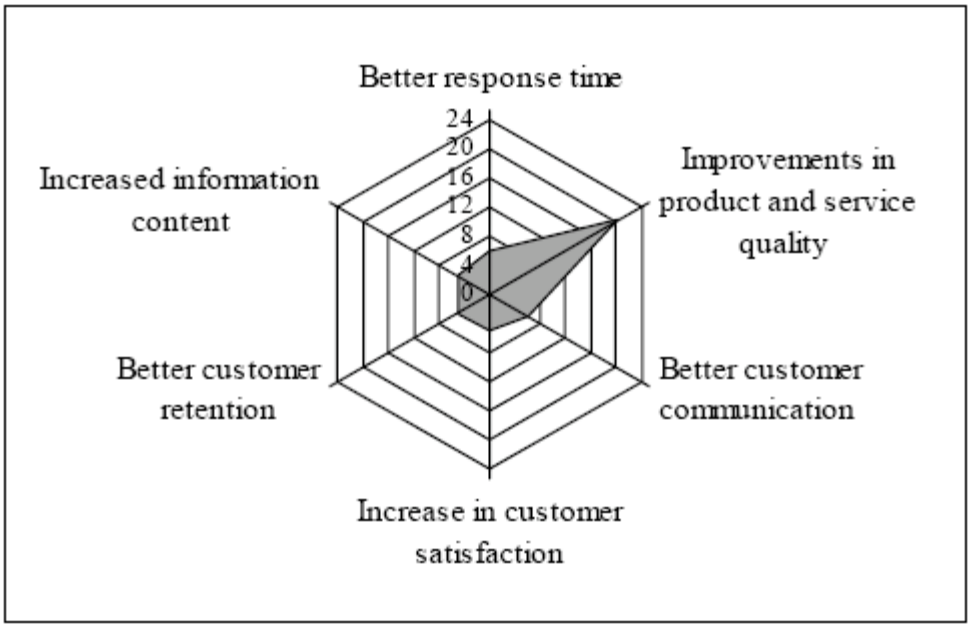


Figure 2.5 – Number of firms reporting a benefit in the area of customer satisfaction (North & Hornung, 2003)

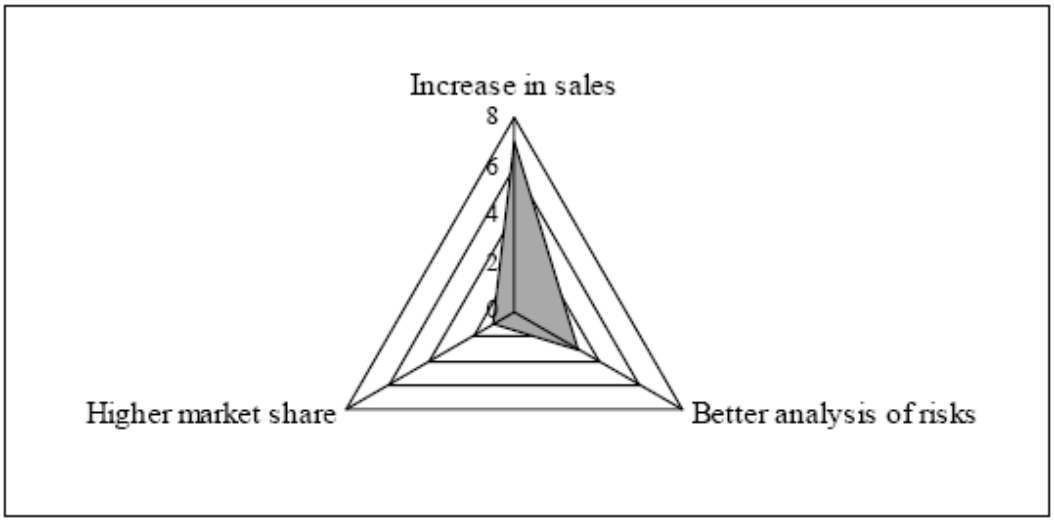


Figure 2.6 – Number of firms reporting a benefit in the area of financial results (North & Hornung, 2003)

North and Hornung's study found that the benefits knowledge management provided to an organization depended upon the KM approach taken (Figure 2.7). The

three approaches identified were either IT-centered, KM applied to specific problem areas, or professional KM. Professional KM was defined as balancing the necessary IT with proper management incentives so that KM is integrated into all business process and projects across the organizations (North & Hornung, 2003). Indeed, this approach resulted in the most reported benefits as well as the most balanced realization of benefits across five categories.

	IT-centred approach	KM solutions applied to specific problem areas	Professional KM
Business Processes			
Better process transparency	5	1	3
Acceleration of processes	4	3	3
Re-use of internal knowledge	1	3	3
Avoidance of redundancies	4	2	4
Total	**14**	9	**13**
Employee Satisfaction			
Increased motivation	1	1	5
Improved team work	1	3	4
Shorter training periods	4	1	4
Total	6	5	**13**
Customer satisfaction			
Improved product/service quality	5	7	8
Better customer communication	0	1	5
Total	5	8	**13**

Figure 2.7 – Benefits depending upon the KM approach taken (North & Hornung, 2003)

The balanced scorecard approach used by North and Horung to categorize KM benefits is also supported by a report from Lopez and Raybourn (2003) of the American Productivity and Quality Center (APQC). Under the APQC KM balanced scorecard

approach, benefits can be broken down into four categories: financial perspective, customer perspective, internal perspective, and innovation & learning (Table 2.1).

Clearly an absolute definitive list of knowledge management benefits has yet to be identified. However, four common categories of KM benefits do seem to emerge: internal or business benefits, customer benefits, employee benefits, and financial benefits (Lopez & Raybourn, 2003; North & Hornung, 2003).

Financial Perspective	**Customer Perspective**
• Increased Sales • Improved Productivity	• Customer satisfaction • Fewer Returns
Internal Perspective	**Innovation & Learning**
• Cycle Time Reduction • Community Participation	• Faster to Competence • Employee Satisfaction

Table 2.1 – APQC KM benefits balanced scorecard

Importance of Identifying Knowledge Management Benefits

It is important for organizations to identify the benefits provided by KM for several reasons. Murray (2002) argues that in order to successfully capitalize on KM, an organization must first decide which particular benefits it desires as the outcome. Unfortunately, little progress has been made with regards to accurately estimating the benefits KM may provide to an organization (Firestone, 2001). In fact, a predominant belief is that simply acquiring and fostering the right knowledge will produce outcomes

that will automatically benefit the organization (Murray, 2002). In other words, not everyone is really sure what KM is doing for them, but if the right knowledge is there, the benefits must be there also. When companies do decide to estimate the benefits of a KM initiative, often there is simply the creation of an intuitive list of outcomes with the assumption that they will be unequivocal benefits (Firestone, 2001). No attempt is made to tie the envisioned outcomes of KM to corporate goals or business processes (Firestone, 2001). Perhaps it is not surprising that many organizations that have implemented KM ultimately have trouble deriving any useful benefits (Murray, 2002).

Measuring the Benefits of Knowledge Management

Another reason for identifying KM benefits is to set the stage for a process of measuring those benefits. Organizational leaders naturally want proof that the money they are investing into a new KM initiative is going to produce a measurable result (Murray, 2002; Skyrme & Amidon, 1998). Unfortunately, one of the problems with KM is that the biggest benefits are often by their very nature immeasurable (Skyrme & Amidon, 1998). After all, how can the value of knowledge contained within an individual's mind be measured quantitatively? This is especially true in business, where the majority of measures are financial in nature (Skyrme & Amidon, 1998). Again, it is difficult to put a dollar value on knowledge.

Taking steps toward measuring the benefits of KM at a minimum first requires identification of those benefits, as it is impossible to measure something that cannot be identified. This problem is recognized across many organizations who are practicing

KM, and has been identified in the academic KM community as well. In a recent study conducted by Edwards, Handzic, Carlsson, and Nissen (2003), finding and measuring the business benefits of KM was identified as a key issue for research.

Benefits of Knowledge Management in the DoD

Civilian organizations are not unique in their need to identify as well as measure the business benefits of KM. Showing a return on investment of KM initiatives in the DoD is just as necessary to gain and keep leadership support (Bartczak, 2002; Bennet & Porter, 2003; DoD/CIO, 2001). While a list of KM benefits can be generated from a commercial perspective, the same list would not necessarily apply from a DoD perspective. As North and Hornung's (2003) study suggests, the benefits knowledge management provided to an organization depended upon the KM approach taken. Ultimately each organization must generate a list of benefits appropriate to their specific business objectives (Firestone, 2001).

As of yet, no studies have been conducted with the goal of identifying the specific benefits that the DoD should expect from practicing KM. As a first step, this thesis attempts to build a cursory list of KM benefits that are already being realized through some of the KM efforts present across the DoD.

III. METHODOLOGY

Introduction

The goal of this research is to identify the realized benefits of KM in the DoD. While several attempts at such research have been made in the commercial sector, there is a lack of research in this arena that takes into account the unique DoD perspective. For this reason, it appeared a Delphi study would be an appropriate starting point for examination of the issue. Lindstone and Turoff (2002) note that the Delphi method is a particularly valid choice when the problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis.

Overview of Methodology

The first stage of research for this thesis began with a literature review in order to identify the issue and develop the subject background. A list of KM benefits pulled from existing research on commercial organizations was then compiled. During the second stage, a formal study was conducted to validate this list of benefits from a strictly DoD perspective. The Delphi method was used to identify a consensus among a group of DoD KM experts regarding which benefits were key in a DoD context. Results were analyzed in the final stage, and recommendations developed.

Delphi Method

The Delphi method is a structured, multipass group decision process developed to address research problems where there is no rigid answer (Keil, Tiwana, & Bush, 2002).

It is designed to draw on a group of experts to solve a problem in a specific area while minimizing the negative effects of group interaction (Rowe & Wright, 1999). Key provisions of the Delphi method are:

- Feedback of individual contributions of information and knowledge
- Assessment of the group judgment or view
- Opportunity for individuals to revise views
- A degree of anonymity for the individual responses

(Lindstone & Turoff, 2002)

The Delphi method is quite flexible, and can be applied any number of different ways as long as the key provisions are incorporated. According to Lindstone and Turoff (2002), "if anything is 'true' about Delphi today, it is that in its design and use Delphi is more of an art than science."

Application of the Delphi method for this research effort was adapted from Keil et al.'s (2002) study of user and project manager perceptions of IT risk. The initial step of this particular study was to select a panel of domain experts. For the first round of research, each expert was presented with a list of issues related to the research problem and asked to rate the issues in terms of significance. Data were collated and an overall consensus for each rating was computed using the mean as well as standard deviation for each response. For the second and final round, panelists were presented with the issues,

along with the group consensus measurements. At this point, each expert was given an opportunity to review their ratings in light of the group response.

Delphi Limitations

Delphi should not be used unless three critical conditions are present. First, adequate time must be available to thoroughly conduct the study, which is generally estimated at a minimum of 45 days. Second, participants must be knowledgeable and able to clearly communicate their ideas. Third, a high degree of motivation is needed to offset the tendency for participants to drop out as the study progresses (Delbecq, Van De Ven, & Gustafson, 1975). Lindstone and Turoff (2002) note the potential problem of participant dropout as well, and suggest that failure to allow participants to contribute their own opinions and perspectives can negatively impact results. Finally, Lang (1998) warns of the problem of bias in Delphi studies that can result from poorly worded or leading questions.

Several steps were taken to counteract these limitations for this study. First, a period of two months was set aside to conduct the Delphi research in order to give ample time for survey responses. Second, participants were selected from a pool of experts who have had at least one year of experience implementing knowledge management initiatives in the DoD, which increased the likelihood that they had both extensive knowledge of the subject and an ability to communicate ideas. Third, respondents were assumed to be sufficiently motivated due to their decision to voluntarily participate in the study. Panel members were solicited via an open invitation letter which clearly identified participation

as optional. In addition, panel members were given an opportunity to provide comments regarding each potential benefit and how it applies specifically to their organization within the DoD. This, as well as the opportunity to answer an open-ended question at the end of each questionnaire, follows Lindstone and Turoff's suggestion to avoid a negative impact on results by allowing the participants to contribute personal opinions. Finally, the bias problem related to poorly worded or leading questions identified by Lang was avoided since no direct questions were asked in the Delphi portion of the survey. Respondents were simply presented with an initial list of items and asked to rate the degree of benefit for each.

Delphi Committee Development and Participant Selection

Selecting the appropriate members of the Delphi panel is the key to successful application of the method (Gordon, 1992). Since results of the study are entirely dependent upon the expertise and knowledge of the panel members, it is essential to select experts in a manner consistent with the goals of the research effort. For this research, selection criteria was consistent with Holsapple and Joshi's (2000) Delphi study identifying KM influence factors. The panel consisted of Department of Defense personnel having an active track record in KM leadership and/or practice. In addition, each member has had at least two years of experience working with KM. In order to take into account both an overall strategic as well as a more directly observed perspective on KM benefits, care was taken to include both those who are leading the KM charge in the DoD as well as those who have been directly involved with the implementation of KM

projects. To ensure applicability across the entire organization, as well as account for variations across services, it was essential to solicit input from all military branches as well as the overall DoD level.

The final Delphi panel consisted of both leaders and practitioners in the Army, Navy, Air Force, Defense Logistics Agency, and the Defense Information Services Agency. In order to mitigate the differing viewpoints of leadership versus practitioners, input was garnered from several high-level leaders involved in KM (CIO level). The remaining members had experience as a practitioner implementing at least one large-scale knowledge management project for their respective organization. An organizational breakdown of the Delphi panel is provided in table 3.1.

ORGANIZATION	**DELPHI PARTICIPANTS**
Army	4
Navy	1
Marines	1
Air Force	1
Defense Logistics Agency (DLA)	1
Defense Information Services Agency (DISA)	3

Table 3.1 – Delphi panel breakdown by organization

Initial invitations to participate in the study were submitted to a group of individuals identified through the DoD Knowledge Management community of practice

(CoP) located at http://dodkm.communispace.com. Membership in this community of practice is reserved for personnel who have a direct impact upon KM activities across the DoD, which made it an excellent resource to locate potential panel members who met the criteria for this study. An initial list of possible members was compiled by reading the member biographies located at the CoP website and screening for individuals who might fit the study criteria. Invitations to participate in the study were sent which identified the need for participants who had at least one year of experience working with KM and were currently overseeing or working with KM in their organizations.

A total of 11 individuals were finally selected for the committee, which is consistent with other Delphi studies. There is no clear consensus on the number of individuals required for a Delphi panel, though Helmer and Dalkey (1983) used a panel of only seven experts in their original Delphi experiment of 1953. Clayton (1997) found that a Delphi panel consisting of a homogeneous group of experts from the same discipline (i.e. all electrical engineers) needs 15-30 people, while a more heterogeneous group (i.e. experts from the same area, but different social/professional levels) needs only 5-10 members. The 11 members of this Delphi panel consisted of a heterogeneous group of DoD KM experts representing both the leadership as well as practitioner levels, which should allow for an adequate diversity of inputs. A list of nine participants along with their organization and position as well as a summary of the KM systems/programs they are responsible for can be found in Appendix A. Two participants chose not to divulge any personal information.

Consensus

One of the goals of the Delphi process is to identify a consensus among the panel members regarding the issues. In fact, when the method was first developed in the 1950's, establishing consensus was seen as the primary goal (Scheibe, Skutsch, & Schofer, 1975). However, as time passed and the methodology matured, non-consensus was also seen as a valid result of the Delphi methodology, as was non-consensus with a trend toward consensus (Lindstone & Turoff, 2002).

For this particular application of the Delphi, identifying consensus as well as a trend toward consensus were both desired outcomes. Knowledge management is still a new and emerging practice, especially within the DoD. Given the diversity of organizational goals across the DoD, as well as the differing levels of KM maturity, it is highly unlikely that a heterogeneous group of experts would come to a consensus on each and every KM benefit.

Several methods of measuring consensus have been identified in the literature (Bower, 2001). Two examples are achieving a decrease in standard deviation between rounds (Dickson, Leitheiser, Wetherbe, & Nechis, 1984) and a reduction in the variance of participant responses over successive rounds (Rowe & Wright, 1999). Scheibe, Skutsch, and Schofer (1975) refer to consensus being achieved when there is a variation in average response of less than 15% over succeeding rounds. This is also known as opinion stability.

For this research effort, consensus and opinion stability measurement have been adapted from the method used by Bower (2001) in his research regarding the

development of a decision framework for KM projects. Consensus will be determined by comparing group responses to a mean group score for each questionnaire item. A reduction in the standard deviation of the mean group score through succeeding rounds will be seen as movement towards consensus (Rowe & Wright, 1999). For this study, the following definitions were used:

CONSENSUS:

- 90% or more of all respondents' inputs (10 of 11 total) fall within +/- 1 standard deviation of the group mean. Fractional numbers for the upper and lower bounds are rounded to the nearest whole number. Also, of the remaining 10%, no more than one response can have an overall opinion that conflicts with the group response (i.e. all group responses but one fall within the 1-3 range (generally agree not a benefit) or 4-6 range (generally agree is a benefit) (Bower, 2001).

MOVE TOWARD CONSENSUS:

- A decrease in the standard deviation of an item's response between rounds will indicate a trend toward consensus for that item.

Again, although consensus of the group response is being measured, this is not the only function of the Delphi method for this research. Identification of benefits where consensus has yet to be achieved, but there is evidence of a trend towards consensus, is also important.

Compilation of KM Benefits

A list of 16 KM benefits were compiled for creation of the Delphi questionnaires. The benefits fell into four categories using the balanced scorecard approach toward KM

benefits, which was outlined in chapter II. More specifically, each benefit was adapted from those identified in North and Hornung's (2003) KM benefits study. Since the DoD is a non-profit organization, benefits related to financial results were removed for this application. Of the remaining benefits, the business process benefit of "better process transparency" and employee satisfaction benefit of "increased personal market value" were determined to be non-applicable to the DoD realm, and thus removed. The final 16 benefits used for the Delphi questionnaire are listed in Table 3.2.

BUSINESS PROCESS BENEFITS
Acceleration of processes
Avoidance of redundancies
Re-use of internal knowledge
Reduction of errors
Time savings in doing routine work
CUSTOMER SATISFACTION BENEFITS
Better response time
Improvements in product and service quality
Better customer communication
Increase in customer satisfaction
Better customer retention
Increased information content
EMPLOYEE SATISFACTION BENEFITS
Increased motivation
Improved teamwork
Shorter training periods
Development of job skill
Enhancement of personal knowledge

Table 3.2 – KM benefits identified from literature for Delphi research

It is important to remember that these benefits have been validated in the literature as being applicable to commercial organizations. The goal of this Delphi research is to determine their potential applicability to KM in the DoD.

IV. RESULTS AND ANALYSIS

Introduction

This chapter will begin with a quick summary of the Delphi process used for this research effort, including a quick overview of the questionnaire submission and response outcomes, as well as a short summary of the results. A detailed analysis of each Delphi item will follow, including consensus and opinion stability measurements, as well as a summary of comments submitted by the committee members. A discussion on the group response regarding the difficulty of measuring KM benefits is presented next, followed by a final review of the research questions.

First Round: Questionnaire One

Participants were asked to examine the list of 16 KM benefits and rate each item based upon a 6-point Likert-type scale (1 = no benefit, 6 = strong benefit). Each member was also asked to provide comments regarding each potential benefit's applicability to his/her specific organization. Finally, the respondents were asked an open-ended question designed to identify any KM benefits they had observed in their organizations that were not present in the list provided.

For both the first and second rounds, the survey was sent as a Microsoft Word attachment via electronic mail. Respondents were asked to return the survey via e-mail within 14 days of receiving the questionnaire. Refer to Appendix B for a copy of questionnaire one.

Four round one questionnaires were returned within five days of submission to the panel, and three more were returned before the 14-day deadline had been reached. A follow-up e-mail was sent to the remaining panel members, and all round one questionnaires were returned within the next five days. Six items achieved consensus in the first round.

Second Round: Questionnaire Two

In the second and final questionnaire, panel members were presented with a list of benefits that did not achieve consensus in round one, along with the comments provided by each panel member. Members were asked to review their round one response for each benefit, taking into consideration the group mean response as well as the group comments. For each item, the respondent could either keep their initial rating or change it to better agree with group consensus. An explanation was required for any rating that didn't coincide with the group mean. In other words, a mean rating of 4 or above would require a respondent to explain an individual rating of 3 or below. Similarly, a mean rating of 3 or below would require an explanation for a rating of 4 or above. Finally, panelists were asked a single open-ended question designed to identify any problems they might experience measuring KM benefits in their organization. Refer to Appendix C for a copy of questionnaire 2.

Eight questionnaires were returned before the 15 Dec 03 due date. Reminders were sent to each of the remaining three panel members, however no additional responses were received until after the holiday break. Two more questionnaires were returned by 5

Jan 04. One participant was unavailable for a great length of time and was unable to return the final round two questionnaire until 20 Jan 04. However, this resulted in a 100 percent response rate with all 11 round one and two questionnaires returned for analysis.

Responses to questionnaires one and two were analyzed to determine group consensus. The mean benefit rating from each participant was computed, along with the standard deviation. Consensus was achieved if at least 10 of 11 ratings fell within one standard deviation of the mean rating. For those items that did not achieve consensus after round two, a trend toward consensus was calculated by comparing the standard deviation of the mean responses between the two rounds. A reduction in the standard deviation of the mean responses was seen as a trend toward consensus.

After the first round, consensus was achieved on 6 of the 16 items in the Delphi questionnaire. After round two, no further consensus was achieved on the remaining items. However, a trend toward consensus was measured on 9 of the 10 remaining items yet to achieve full consensus. The final remaining item indicated an increase in the standard deviation of the mean response between rounds, signaling a continual lack of consensus among the group on that item. Table 4.1 presents a summary of the steps taken in the Delphi process for this research effort.

	Round 1	**Round 2**
Date Mailed	3 Nov 2003	1 Dec 2003
Date Due	17 Nov 2003	15 Dec 2003
Instrument	Likert Scale	Likert Scale
Data Collected	Level of impact for each identified item, identification of additional impacts	Level of impact for each identified item, reason for disagreeing with consensus, suggestions for resolving impacts
Data Analysis	Compute mean, standard deviation	Compute mean, standard deviation
Consensus Achieved?	6 of 16 items	No further consensus, however move toward consensus achieved for 9 of the 10 remaining items

Table 4.1 – Summary of Delphi process

Summary of Results

Analysis of the Delphi questionnaires resulted in seven items being identified by the group as having a benefit related to KM in the DoD. Nine more items were identified as not having a benefit, though one of those items failed to achieve consensus or a move toward consensus. Table 4.2 represents the list of questionnaire items along with their relevant benefit and consensus data.

BUSINESS PROCESS BENEFITS	Benefit	No Benefit	Consensus	Movement Toward Consensus
Acceleration of processes	X			X
Avoidance of redundancies		X	X	
Re-use of internal knowledge	X			X
Reduction of errors		X	X	
Time savings in doing routine work	X		X	
BENEFITS CONCERNING CUSTOMER SATISFACTION	**Benefit**	**No Benefit**	**Consensus**	**Move Toward Consensus**
Better response time		X		X
Improvements in product and service quality		X		X
Better customer communication		X		X
Increase in customer satisfaction		X		X
Better customer retention		X	X	
Increased information content	X		X	
BENEFITS CONCERNING EMPLOYEE SATISFACTION	**Benefit**	**No Benefit**	**Consensus**	**Move Toward Consensus**
Increased motivation	X			X
Improved teamwork	X		X	
Shorter training periods	No consensus mesasured			
Development of job skill		X		X
Enhancement of personal knowledge	X			X

Table 4.2 – Summary of Delphi questionnaire analysis results

Six items immediately achieved consensus among the 11 members of the Delphi panel after the first round. Of the six items, three were agreed upon by the panel as generally having *no* benefit related to KM practice in the DoD. Again, for analysis purposes, an item with a mean rating below 3.5 was seen as having no benefit related to KM in the DoD, since it's ratings were generally at the low-end of the scale. An item with a mean rating above 3.5 was seen as having a benefit, since the majority of its ratings were at the upper-end of the scale. The items along with their mean ratings are identified in Table 4.3 below.

Potential KM Benefit	Mean Rating
Avoidance of redundancies	3.18
Reduction of errors	3.27
Better customer retention	2.18

Table 4.3 – Consensus items identified as NOT A BENEFIT related to KM

The other three items that achieved consensus were identified by the panel as a general benefit related to KM practice in the DoD (mean rating above 3.5). The items along with their mean rating are presented in Table 4.4 below.

Potential KM Benefit	Mean Rating
Time savings in doing routine work	4.09
Increased information content	4.27
Improved teamwork	3.91

Table 4.4 – Consensus items identified as a BENEFIT related to KM

The remaining 10 items failed to achieve consensus after the second round. Of the 10 remaining items, 9 achieved a reduction in the standard deviation of the mean rating from round one to round two. This indicates a move toward consensus, since it signals that the variation among the ratings being submitted by the panel members is getting smaller. In other words, the ratings are starting to center upon a common number. The items along with their mean rating standard deviations in round one and round two are identified in Table 4.5 below.

Potential KM Benefit	Round 1 Std Dev	Round 2 Std Dev
Acceleration of processes	1.48	1.34
Re-use of internal knowledge	1.34	1.08
Better response time	1.57	1.49
Improvements in product service and quality	1.66	1.51
Better customer communication	1.54	1.38
Increase in customer satisfaction	1.12	0.81
Increased motivation	1.57	1.25
Development of job skill	1.51	1.30
Enhancement of personal knowledge	1.80	1.42

Table 4.5 – Items indicating a move toward consensus

Four of the nine items showing a move toward consensus featured a mean rating above 3.5, which according to the definition presented earlier indicates the panel identified them as having a benefit related to KM in the DoD (Table 4.6). The five remaining items earned a mean rating of 3.5 or below, indicating a general belief that they are likely not a benefit related to KM in the DoD (Table 4.7).

Potential KM Benefit	Mean Rating
Acceleration of processes	4.00
Re-use of internal knowledge	4.18
Increased motivation	3.82
Enhancement of personal knowledge	4.27

Table 4.6 – Items moving toward consensus and identified as a BENEFIT related to KM

Potential KM Benefit	Mean Rating
Better response time	3.27
Improvements in product and service quality	2.91
Better customer communication	3.09
Increase in customer satisfaction	2.36
Development of job skill	3.09

Table 4.7 – Items moving toward consensus but identified as NOT A BENEFIT related to KM

The final remaining item, development of job skill, failed to achieve consensus or indicate a movement toward consensus. The standard deviation of the mean rating for this item increased from 1.41 in round one to 1.49 in round two, while the mean rating increased from 3.00 in round one to 3.27 in round two. Further detail of what this might mean is presented later in the next section of this thesis, which features an in-depth analysis of each item and incorporates the written comments submitted by each panel member.

Analysis of Individual Item Responses

The following section details the response for each benefit contained in the Delphi questionnaires. Each item will follow the same format, beginning with whether the

benefit reached consensus or opinion stability, as well as a table detailing the actual consensus calculations for each item. A summary of the written responses provided by each panel member will also be presented. For analysis purposes, a mean benefit rating below 3.5 for an item indicates that item was generally *not* considered to be a benefit related to KM. Conversely, a mean benefit rating above 3.5 indicates the item was generally considered to be a benefit. A comprehensive list of comments supplied by each panel member can be obtained by reviewing the round two questionnaire in Appendix C.

Business Process Benefits

These items focused on benefits of KM specifically related to the business processes of an organization. Three of the items achieved consensus after the first round, while the remaining two showed a movement toward consensus after the second round.

Item 1: Acceleration of processes

This item did not achieve a consensus after round two. However, a decrease in the standard deviation of the mean response between rounds was measured, signaling a trend toward consensus. The mean response after round two was 4.00, which indicates *acceleration of business processes* was generally considered to be a benefit related to KM in the DoD. Table 4.8 lists the ratings and consensus calculations for this item.

Acceleration of Processes		
	Round 1 Rating	Round 2 Rating
Respondent 1	6	6
Respondent 2	6	5
Respondent 3	5	5
Respondent 4	4	4
Respondent 5	2	2
Respondent 6	5	5
Respondent 7	2	2
Respondent 8	3	3
Respondent 9	5	5
Respondent 10	3	3
Respondent 11	3	4
Mean	4.00	4.00
Std Deviation	1.48	1.34
Upper / Lower Bound	5.48 – 2.52	5.34 – 2.66
BENEFIT		

Table 4.8 – Final ratings and consensus calculations for *acceleration of processes*

Seven of the 11 respondents submitted a final rating for this benefit of at least a four or above. For these respondents, the general consensus seemed to be that having a KM system allows people to spend less time looking for information, which means more time spent producing results. One member commented, "With the implementation of KM we have been able to automate and streamline several reporting processes. The data is more accurate and timely." Another noted that KM had allowed his organization to move away from PowerPoint methods of sharing information into a database driven approach. This facilitated an automation of processes that had previously been manually performed. Still another was careful to point out that although KM had indeed

streamlined processes, in some cases it merely "sped up the mess" and automated a process that was not efficient in the first place.

The remaining four respondents submitted a rating of 3 or below, indicating they generally believed acceleration of business process was not a benefit related to KM in the DoD. One respondent felt that, while KM should indeed have process benefits, she hadn't seen them yet in her organization. She elaborates:

> "Everyone wants KM and collaboration but they don't know what they want to do with it. They just know it's the hot thing. There are certainly some early adopters who are driving process change, but by and large, I perceive people feel they don't have the time or money to devote to changing the process. This takes a lot of hand-holding to change the culture."

Another panel member indicated that his organization's current KM initiative was too early in the process to claim success, but anticipated that process impact would soon be as positive as some of the other panel members reported.

Item 2: Avoidance of redundancies

This item achieved an immediate consensus at the completion of round one. The overwhelming majority of respondents submitted a rating of 2 or 3 for this particular benefit, with one outlier feeling this item was a strong benefit

warranting a 6 rating. Table 4.9 lists the ratings and consensus calculations for this item.

Comments from the majority of the group indicated that their KM initiative was still not yet embedded enough into the organization to see *avoidance of redundancies* as a

Avoidance of Redundancies		
	Round 1 Rating	Round 2 Rating
Respondent 1	6	N/A Consensus achieved in first round
Respondent 2	3	
Respondent 3	3	
Respondent 4	4	
Respondent 5	3	
Respondent 6	2	
Respondent 7	3	
Respondent 8	2	
Respondent 9	3	
Respondent 10	3	
Respondent 11	3	
Mean	3.18	N/A
Std Deviation	1.08	
Upper / Lower Bound	4.26 – 2.10	
NOT A BENEFIT		

Table 4.9 – Final ratings and consensus calculations for *avoidance of redundancies*

benefit. However, many indicated that they did believe KM would eventually provide this benefit. According to one member:

> "We have made improvements in this area. However since we are still in the pilot phase of our implementation, some redundancy still exists.

> However as more and more people become aware and comfortable with the new tools/capabilities, they are becoming more comfortable with moving away from their manual/redundant processes."

Another simply stated that, "The potential exists, but I don't think KM is sufficiently embedded for people to maximize its use." The individual who believed *avoidance of redundancies* was a strong benefit commented that his organization regularly finds people using the KM tools and expertise instead of reinventing solutions.

Item 3: Re-use of internal knowledge

This item did not achieve a consensus after round two. However, a decrease in the standard deviation of the mean response between rounds was measured, signaling a trend toward consensus. The mean response after round two was 4.18, which indicates *re-use of internal knowledge* was generally considered to be a benefit related to KM in the DoD. Table 4.10 lists the ratings and consensus calculations for this item.

Nine of the 11 respondents submitted a final rating of 4 or above for this item. The general consensus among the panel members was that because of the KM system in place, people were re-using what others had done rather than "re-inventing the wheel." On respondent noted that, "the most difficult aspect to overcome was getting people to contribute. KM does not seem to flourish unless tied to performance appraisals."

Of the two respondents that submitted a rating of 3 or below for this item, one commented that, "If anything, our organization is falling further behind in re-using knowledge as the flood of experience from Southwest and Central Asia overwhelms our current system for digesting them." In other words, the ability to re-use internal knowledge may be severely hampered if a particular KM system does not have the capacity to handle the level of input.

Re-use of Internal Knowledge		
	Round 1 Rating	Round 2 Rating
Respondent 1	6	6
Respondent 2	4	4
Respondent 3	5	5
Respondent 4	5	5
Respondent 5	5	4
Respondent 6	4	4
Respondent 7	5	5
Respondent 8	3	3
Respondent 9	2	4
Respondent 10	2	2
Respondent 11	3	4
Mean	4.00	4.18
Std Deviation	1.34	1.08
Upper / Lower Bound	5.34 – 2.66	5.26 – 3.10
BENEFIT		

Table 4.10 – Final ratings and consensus calculations for *re-use of internal knowledge*

Item 4: Reduction of errors

This item achieved consensus at the end of round one with a mean score of 3.27, indicating that *reduction of errors* was generally not considered to be a

benefit related to KM in the DoD. Five of eleven respondents did submit a rating of 4 or above however, finding that "as we re-use internal knowledge more effectively, errors naturally decline. Table 4.11 lists the ratings and consensus calculations for this item.

Reduction of Errors		
	Round 1 Rating	Round 2 Rating
Respondent 1	5	N/A Consensus achieved in first round
Respondent 2	4	
Respondent 3	4	
Respondent 4	4	
Respondent 5	2	
Respondent 6	1	
Respondent 7	5	
Respondent 8	3	
Respondent 9	3	
Respondent 10	2	
Respondent 11	3	
Mean	3.27	N/A
Std Deviation	1.27	
Upper / Lower Bound	4.54 – 2.00	
NOT A BENEFIT		

Table 4.11 – Final ratings and consensus calculations for *reduction of errors*

The remaining six respondents were not so positive that their KM implementations were reducing errors in their organization, thus resulting in the mean rating below 3.5. Unfortunately, many of these respondents in the 1 to 3 range elected not to comment on their ratings. Of the two that did, one indicated that he didn't find excessive errors to be an organizational problem in the first place. The other noted that,

"slow implementation of cutting-edge KM processes, structures, tools, and mindsets has hampered our potential for reducing errors."

Item 5: Time savings in doing routine work

This was another item that achieved consensus after the first round. The mean rating for this item was 4.09, indicating the panel felt *time savings in doing routine work* was indeed a benefit related to KM practice in the DoD. Table 4.12 lists the ratings and consensus calculations for this item.

Seven of the eleven respondents gave this item a rating of 4 or above and submitted some of the strongest positive comments of all the items in the questionnaire. One respondent commented specifically that they are saving 8 hours a week through their KM initiative, while another stated that, "so far this is the biggest plus for KM." A common theme running through the positive comments was the notion that KM helped increase the efficiency of producing regular reports. For example, one member commented that KM enabled teams to put together daily briefings much faster:

> "Before they had to wait on each team to send an e-mail with the latest file attached. There was often confusion as to which attachment was the latest version. Then the integration team had to review all the daily presentations and eliminate redundancies and try to synchronize the input. Now the KM system provides version control and a way for others to review it and then post comments, so it is a collaborative review process."

The remaining four respondents submitted a rating of 3 or below and did not feel that KM in their organizations was quite ready to provide any *time savings in doing routine work*.

Time Savings in Doing Routine Work		
	Round 1	Round 2
Respondent 1	6	N/A Consensus achieved in first round
Respondent 2	6	
Respondent 3	6	
Respondent 4	5	
Respondent 5	4	
Respondent 6	4	
Respondent 7	2	
Respondent 8	2	
Respondent 9	5	
Respondent 10	2	
Respondent 11	3	
Mean	4.09	N/A
Std Deviation	1.64	
Upper / Lower Bound	5.73 – 2.45	
BENEFIT		

Table 4.12 – Final ratings and consensus calculations for *time savings in doing routine work*

However, their comments were once again related to the level of maturity and acceptance of the KM system. One respondent stated:

> "Our best practices have shown dramatic time savings. The prime community of practice…saves as much as 30 percent for active participants. While we have a state-of-the-art plan for networking the

force with structured CoPs, it has not yet been implemented. Thus, our impact on time savings is limited to fragments of the force."

Similarly, another noted they had not seen any time savings yet, but anticipate big progress once their KM initiative is fully operational.

Benefits Concerning Customer Satisfaction

These items centered on benefits related to organizational customer satisfaction. Two of the six items in this section achieved consensus after the first round, while all remaining items showed a movement toward consensus after the second round.

Item 6: Better response time

This item did not achieve consensus after round two, however it did show a movement toward consensus. The mean rating for this item after round two was 3.27, indicating that the panel did not see *better response time* as a benefit related to KM in the DoD. Table 4.13 lists the ratings and consensus calculations for this item.

Five respondents submitted a rating of 4 or above, believing that KM does indeed provide a timelier response to their customers' needs. One member indicated that customer feedback has been positive regarding requirements being implemented in a timely manner, while another noted a unit deploying overseas had indicated his organization's KM system had saved them significant time in getting up to speed.

According to another respondent, "Judicious use of KM has shown significant reduction in cycle time for those organizations that understand how to implement effectively. Once again, this improvement is seen on a case-by-case basis, not enterprise-wide."

Better Response Time		
	Round 1 Rating	Round 2 Rating
Respondent 1	6	6
Respondent 2	4	4
Respondent 3	5	4
Respondent 4	4	4
Respondent 5	3	3
Respondent 6	1	1
Respondent 7	2	2
Respondent 8	2	2
Respondent 9	5	5
Respondent 10	2	2
Respondent 11	4	3
Mean	3.45	3.27
Std Deviation	1.57	1.49
Upper / Lower Bound	5.03 – 1.88	4.76 – 1.78
NOT A BENEFIT		

Table 4.13 – Final ratings and consensus calculations for *better response time*

The remaining six respondents submitted a rating of 3 or below, however the comment from one of these individuals indicates an expectation for improvement. He writes, "Fielding our Battle Command Knowledge System (BCKS) will transform this into our greatest strength in the next two years." His ratings for the rest of the *benefits concerning customer satisfaction* category are consistently low, with his comments indicating the same reasoning.

A second individual submitted a 1 rating because he saw his organization's KM initiative as, "focused on the internal information and knowledge sharing needs of the Agency." He saw the KM system benefits passed onto customers only, "VERY indirectly." Again, this opinion is reflected in the individual's rating of 1 for every item in the *benefits concerning customer satisfaction* category.

Item 7: Improvements in product and service quality

Consensus was not achieved after round two for this item; however, there was a decrease in the standard deviation of the mean rating between rounds indicating a move toward consensus. The final mean rating for this item was 2.91, indicating the panel did not believe that *improvements in product and service quality* was a benefit related to KM in the DoD. Table 4.14 lists the ratings and consensus calculations for this item.

Only two respondents submitted a final rating of 4 or above for this item, with the remaining 9 respondents awarding a 3 or below. This item received the second-lowest final rating of the 16 items.

Improvement in Product Service and Quality		
	Round 1 Rating	Round 2 Rating
Respondent 1	6	6
Respondent 2	5	3
Respondent 3	5	5
Respondent 4	3	3
Respondent 5	3	3
Respondent 6	1	1
Respondent 7	3	3
Respondent 8	2	2
Respondent 9	1	1
Respondent 10	2	2
Respondent 11	4	3
Mean	3.18	2.91
Std Deviation	1.66	1.51
Upper / Lower Bound	4.84 – 1.52	4.42 – 1.40
NOT A BENEFIT		

Table 4.14 – Final ratings and consensus calculations for *improvement in product and service quality*

Item 8: Better customer communication

Once again consensus was not achieved after round two for this item. However, a decrease in the standard deviation of the mean rating between rounds did signify a move toward consensus. The panel awarded a final mean rating of 3.09 to this category, indicating a general disbelief that *better customer communication* was a benefit of KM in the DoD. Table 4.15 lists the ratings and consensus calculations for this item.

Similar to the last item, only 2 of the 11 respondents submitted a mean rating of 4 or above while the remaining 9 submitted a mean rating of 3 or below. Many member comments remained very similar to the other items in the *benefits concerning customer*

satisfaction group. These included the expectation from one individual that their KM system would provide this benefit once fully on-line, as well as the opinion that the KM system is more for organizational than customer benefit.

Better Customer Communication		
	Round 1 Rating	Round 2 Rating
Respondent 1	3	6
Respondent 2	5	3
Respondent 3	4	3
Respondent 4	3	3
Respondent 5	1	2
Respondent 6	1	1
Respondent 7	5	5
Respondent 8	2	3
Respondent 9	1	3
Respondent 10	2	2
Respondent 11	4	3
Mean	2.82	3.09
Std Deviation	1.54	1.38
Upper / Lower Bound	4.36 – 1.28	4.47 – 1.72
NOT A BENEFIT		

Table 4.15 – Final ratings and consensus calculations for *better customer communication*

Interestingly, several members granted a 3 rating even though their comments were overly positive. One of these individuals noted an, "…almost immediate, requirements and feedback times have improved," while another felt KM indeed provided a faster response time to questions.

Item 9: Increase in customer satisfaction

Consensus was not achieved on this item, however a movement toward consensus was observed after round two. The final mean rating for this item was 2.36, which happened to be the second-lowest rating granted by the group. This indicates the group generally did not consider an *increase in customer satisfaction* to be a benefit of KM in the DoD. This item also had the lowest group mean standard deviation of all the items. Table 4.16 lists the ratings and consensus calculations for this item.

Increase in Customer Satisfaction		
	Round 1 Rating	Round 2 Rating
Respondent 1	3	3
Respondent 2	4	4
Respondent 3	4	3
Respondent 4	2	2
Respondent 5	3	2
Respondent 6	1	1
Respondent 7	2	2
Respondent 8	3	2
Respondent 9	1	2
Respondent 10	2	2
Respondent 11	4	3
Mean	2.64	3.09
Std Deviation	1.12	1.38
Upper / Lower Bound	3.76 – 1.52	4.47 – 1.72
NOT A BENEFIT		

Table 4.16 – Final ratings and consensus calculations for *increase in customer satisfaction*

One member submitted a final rating of 4, and was the only group member to submit a final rating greater than 3 as well as the reason the item did not achieve consensus. The individual's comment attempts a defense of the outlier rating, stating that, "…the KM portal and the tools it offers seem to have a high rate of customer satisfaction."

Of the remaining members who submitted a 3 or below rating, the general feeling seemed to be that of those who first believed they had customers, satisfaction was indeed higher. However, there was no direct evidence available to prove such an increase.

Item 10: Better customer retention

This item achieved consensus after the first round. It also featured the lowest mean rating at 2.18, indicating that the group generally felt it was of no benefit to KM in the DoD. Table 4.17 lists the ratings and consensus calculations for this item.

Two respondents submitted a rating of 4 or above for this item, with one commenting that, "…more customers come to us as we integrate our portal services and we haven't lost any." The other noted that as his organization makes KM tools more accessible, "…employees will continue to find our methods and support tools worth choosing."

The overwhelming majority of panel members submitted a rating of 3 or below for this item. While most chose not to provide comments regarding this

benefit, one did cite the soldier on the field as a customer and the inability to retain them despite making KM tools available.

Better Customer Retention		
	Round 1	Round 2
Respondent 1	1	N/A Consensus achieved in first round
Respondent 2	5	
Respondent 3	3	
Respondent 4	2	
Respondent 5	1	
Respondent 6	1	
Respondent 7	2	
Respondent 8	2	
Respondent 9	1	
Respondent 10	2	
Respondent 11	4	
Mean	2.18	N/A
Std Deviation	1.33	
Upper / Lower Bound	3.51 – 0.85	
NOT A BENEFIT		

Table 4.17 – Final ratings and consensus calculations for *better customer retention*

Item 11: Increased information content

This was another item that achieved consensus in the first round, and incidentally featured a final mean rating that tied for first with item 16, which was *enhancement of personal knowledge*. The mean rating of 4.27 indicated the group believed that *increased information content* was a general benefit related to KM in the DoD. Table 4.18 lists the ratings and consensus calculations for this item.

Increased Information Content		
	Round 1	Round 2
Respondent 1	6	N/A Consensus achieved in first round
Respondent 2	6	
Respondent 3	6	
Respondent 4	5	
Respondent 5	3	
Respondent 6	1	
Respondent 7	6	
Respondent 8	2	
Respondent 9	6	
Respondent 10	2	
Respondent 11	4	
Mean	4.27	N/A
Std Deviation	1.95	
Upper / Lower Bound	6.23 – 2.32	
BENEFIT		

Table 4.18 – Final ratings and consensus calculations for *increased information content*

Seven of the 11 respondents submitted a rating of 4 or above, with five submitting a max rating of 6. Group comments indicated that the more KM services brought online, the more information content increases and information quality improves. However, managing the information and knowledge generated seemed to be a hurdle, as one member indicated:

> "The amount of information growth was phenomenal after the initial standup of the Intranet. CoPs were more difficult to standup and populate. As employees began to realize there was a single source of reliable information they could count on, they too began to contribute. This leads to an issue that was of concern. Information quality can be an issue. Data

owners/Knowledge Center managers were needed to reduce or eliminate invalidated or poor quality information. But these tend to be your brightest and busiest people. Convincing them to expend the effort was difficult, even for those who understood the long-term benefits. The human factor (i.e. INCENTIVES) are crucial to obtain support for KM!"

Of the four respondents who chose a rating of 3 or below, only one chose to leave a comment. His comment again centers of the difficulty of managing such a large flux of information:

"This is a hard one, since information content has exploded by, and this is just a guess, over fifty percent increase per year. However, without effective knowledge representation, an ubiquitous nested network of CoPs, or a systematic approach to upgrading data and information to actionable knowledge and genuine understanding, we have increased our ability to handle information only marginally perhaps (again, a guess), by around three percent per annum. The result is marginal increase in usable information content."

Benefits Concerning Employee Satisfaction

These items centered on benefits related to organizational employee satisfaction. Only one of the five items in this section achieved consensus, while three items showed a

movement toward consensus after the second round. The last item failed to achieve either consensus or a movement toward consensus.

Item 12: Increased motivation

This item did not achieve consensus after the second round. The standard deviation of the final mean rating did decrease between rounds, however, signaling a move toward consensus. A final group mean rating of 3.82 was observed, indicating a belief that *increased motivation* was generally a benefit of KM in the DoD. Table 4.19 lists the ratings and consensus calculations for this item.

Increased Motivation		
	Round 1 Rating	Round 2 Rating
Respondent 1	6	6
Respondent 2	5	4
Respondent 3	5	5
Respondent 4	4	4
Respondent 5	3	3
Respondent 6	3	3
Respondent 7	5	5
Respondent 8	2	2
Respondent 9	1	4
Respondent 10	2	2
Respondent 11	4	4
Mean	3.64	3.82
Std Deviation	1.57	1.25
Upper / Lower Bound	5.20 – 2.07	5.07 – 2.57
BENEFIT		

Table 4.19 – Final ratings and consensus calculations for *increased motivation*

Seven of the eleven participants submitted a rating of 4 or above for this item. Of those seven that submitted comments, there was a clear indication of an increase in motivation and satisfaction related to the KM program. One respondent commented, "Internally, our support staff feels job satisfaction but as an organization, I think that we've made people's jobs easier so I would think that increases their motivation to use the KM tools and to pursue other efforts since they've saved time due to KM." Another stated that, "most employees who are involved with our KM efforts have been most enthusiastic."

The remaining four respondents submitted a final rating of 3 or below. Of the three that submitted comments, one member indicated once again that his organization's KM system was not mature enough yet to reap this benefit yet. Another believed that, "Those that took the time to use it really liked it, but there are still those who feel they are too busy to sit down and learn even thought hey agree it will improve their work." The final respondent agreed that his employees saw the value of KM, but could not say that he necessarily observed an increase in motivation because of their KM system.

Item 13: Improved teamwork

This item achieved consensus after the first round. The final group mean rating was 3.91, indicating a belief that *improved teamwork* was generally a benefit related to KM in the DoD. Table 4.20 lists the ratings and consensus calculations for this item.

Despite the Delphi methodology indicating consensus on this item, only five of the eleven members of the panel submitted a rating of 4 or above. However, three of

these individuals felt strongly enough about this particular benefit to submit a 6 rating, while the two others submitted a 5. Comments from these members included:

> "Organizationally, we're working more cross-functionally. Internally, we're definitely experiencing teamwork."

> "Great improvement in the ability of the integration team to manage seven different groups developing products. More cross-fertilization and synchronization of the outcomes."

> "We have used collaboration very effectively to improve teamwork and knowledge sharing."

Three of the eleven panel members submitted a rating of 3 for this item, while the remaining three submitted a two. Comments from this end of the panel indicated the difficulty in this area stemmed around the inclination for people to want to keep knowledge to themselves:

> "Mixed bag. The potential is strong. Early adopters are already good team players and very productive. There are also laggers that find knowledge sharing to be threatening to individual gains."

> "Our applications respect the needs that teams have to keep certain information 'close hold' within the team, while also allowing for the sharing of that information to a broader audience. To that extent, we are supporting teamwork and not undermining it by making sharing mandatory."

Another of these respondents commented, "People are less dependent on others, so they tend to talk less to co-workers…this is not good."

Improved Teamwork		
	Round 1	Round 2
Respondent 1	6	N/A Consensus achieved in first round
Respondent 2	6	
Respondent 3	6	
Respondent 4	3	
Respondent 5	5	
Respondent 6	3	
Respondent 7	3	
Respondent 8	2	
Respondent 9	5	
Respondent 10	2	
Respondent 11	2	
Mean	3.91	N/A
Std Deviation	1.70	
Upper / Lower Bound	5.61 – 2.21	
BENEFIT		

Table 4.20 – Final ratings and consensus calculations for *improved teamwork*

Item 14: Shorter training periods

This item did not achieve consensus after the first round. A decrease in the standard deviation was not observed, making this the only item that also did not achieve a movement toward consensus. Part of this may be attributed to one member radically changing his rating from a 1 to a 6. The final mean rating was 3.27, indicating the group believed that *shorter training periods* was generally not a benefit related to KM in the DoD. Table 4.21 lists the ratings and consensus calculations for this item.

Shorter Training Periods		
	Round 1 Rating	Round 2 Rating
Respondent 1	6	6
Respondent 2	3	3
Respondent 3	4	3
Respondent 4	4	4
Respondent 5	2	2
Respondent 6	2	2
Respondent 7	2	2
Respondent 8	2	2
Respondent 9	1	6
Respondent 10	3	3
Respondent 11	4	3
Mean	3.00	3.27
Std Deviation	1.41	1.49
Upper / Lower Bound	4.41 – 1.59	4.76 – 1.78
NOT A BENEFIT		

Table 4.21 – Final ratings and consensus calculations for *shorter training periods*

Two of the eleven respondents felt very strongly that *shorter training periods* was indeed a benefit, submitting a rating of 6 for this particular item. One of these individuals

actually changed their round one rating of 1 to a 6 in round two because of a reinterpretation of KM to include distributed learning. He noted, "We have a formal program for implementing distributed learning to reduce on-site training." Another respondent submitted a 4 rating for this item, stating:

> "As part of our new personnel orientation, a thorough introduction and review of the intranet and its components was provided. New employees/Marines now had immediate access (via the search engine) to data and SME's (Subject Matter Experts) that enabled them to perform at a level that previously would have taken at least 6 months to attain."

Despite the enthusiasm for these three members, the overwhelming majority of the panel submitted a rating of 3 or below. Most did not provide comments, however one individual noted:

> "To the extent that our centralized repositories of information are available for future reference (e.g., for new employees), it is easier for folks to find what they need in order to get up to speed on new projects to which they have been assigned. However, learning new jobs requires a richer set of knowledge that is usually contextually unique. We have addressed overarching information and knowledge needs of the Agency, not the specific training needs of individual positions."

Item 15: Development of job skill

This was another item that did not achieve consensus after the first round. However, a move toward consensus was observed due to a decrease in the standard deviation of the mean rating between round one and two. A final mean rating of 3.09 was observed, indicating the panel felt that *development of job skill* was generally not a benefit related to KM in the DoD. Table 4.22 lists the ratings and consensus calculations for this item.

Only two respondents awarded this item with a mean rating of 4 or above. One indicated a rating of 6 but did not provide comments, while the other submitted a 5, stating:

> "We've definitely made this [development of job skill] easier for the organization. They [employees] can manage their efforts better and easier, and integrate results all at the touch of a key. We're helping everyone develop better management/job skills."

The remaining panel members submitted a rating of 3 or below, with five indicating a 3 rating and four indicating a 2 rating. However, the limited range of comments did not provide a clear indication as to why the low ratings were chosen. One member indicated that, "…learning a new way of thinking about developing products and staffing documents has opened people's minds about the possibility." Another stated simply, "Have not seen much in this area."

Development of Job Skill		
	Round 1 Rating	Round 2 Rating
Respondent 1	6	6
Respondent 2	5	5
Respondent 3	3	3
Respondent 4	3	3
Respondent 5	4	3
Respondent 6	2	2
Respondent 7	2	2
Respondent 8	2	2
Respondent 9	1	3
Respondent 10	2	2
Respondent 11	4	3
Mean	3.09	3.09
Std Deviation	1.51	1.30
Upper / Lower Bound	4.60 – 1.58	4.39 – 1.79
NOT A BENEFIT		

Table 4.22 – Final ratings and consensus calculations for *development of job skill*

Item 16: Enhancement of personal knowledge

This was the final Delphi questionnaire item, and once again did not achieve consensus after the second round. However, a move toward consensus was observed due to a decrease in the standard deviation of the mean rating between round one and round two. The final rating of 4.27 tied with *increased information content* as the highest rating of the 16 items, and indicates that *enhancement of personal knowledge* was considered to be a general benefit related to KM in the DoD. Table 4.23 lists the ratings and consensus calculations for this item.

Enhancement of Personal Knowledge		
	Round 1 Rating	Round 2 Rating
Respondent 1	6	6
Respondent 2	6	5
Respondent 3	6	5
Respondent 4	6	5
Respondent 5	5	5
Respondent 6	2	2
Respondent 7	3	3
Respondent 8	2	2
Respondent 9	6	6
Respondent 10	2	4
Respondent 11	4	4
Mean	4.36	4.27
Std Deviation	1.80	1.42
Upper / Lower Bound	6.17 – 2.56	5.69 – 2.85
BENEFIT		

Table 4.23 – Final ratings and consensus calculations for *enhancement of personal knowledge*

Eight of the eleven respondents submitted a rating of 4 or above, with two indicating that they saw this as the best benefit of KM:

> "Probably the single best benefit to the workforce. Peoples' awareness of upcoming events, training, references, how-to's, etc. was at a level never before seen in the command. As a result, seemed to be better informed than ever. In fact, when attempts were made to scale by certain portions of the Intranet, there was a hue and cry to keep all functions in place. The saying 'you don't know what you've got until it's gone' applies to useful information and KM in general."

> "Probably the biggest plus…the cross-functional sharing of knowledge across the organization…the beginning of real cultural change towards open communication and knowledge sharing."

Another individual believed that this benefit was, "only limited by the proactive-ness of the individual." Still another agreed to an extraordinary enhancement of knowledge, however, "the challenge is to make knowledge available easily and quickly."

Of the three remaining members who awarded a 3 or below rating, one indicated again that their system was not yet at the level of providing this benefit, though it would be in the immediate future. The other commented that they were, "…just beginning to tackle the hard problem of sharing tacit knowledge, so I would not say that we have yet significantly enhanced personal knowledge."

Measuring KM Benefits

The round two questionnaire featured one final open-ended question designed to get a general feel for whether or not the individuals had difficulty measuring the benefit of KM in their organizations. Respondents were asked, "Do you experience problems measuring KM benefits in your organization? Please explain." No attempt at reaching a consensus was made regarding this item. Rather the goal was again to "test the waters" and get the expert's general feelings on this issue. All eleven panel members indicated a difficulty measuring the benefits of KM in their organization.

Several panel members commented on the particular difficulty measuring the often intangible but highly beneficial outcomes of KM. As discussed in the literature review, it is hard to measure the value of something that primarily exists in the minds of organizational members. One panel member noted the difficulty of getting senior leadership to break away from the traditional model of organizational performance measures (i.e. cost and time savings) and attempt to recognize some of the less tangible outcomes associated with KM. Another member's comment sums the issue up nicely:

> "Much of the value of KM is found in intangibles or things we don't measure well--time saved (unless you are a contractor on the clock, government time is considered 'free and paid for'); money saved--(most cost savings come from eliminating jobs that used to do a task, but we generally don't eliminate jobs in the government). KM is probably more accurately measured in terms of anecdotal stories--it used to take me x hours to do this and I've cut my time in half (a perception, feeling, not a validated clock time)."

A few panel members resorted to basic measures in order to provide at least some idea that their KM initiative was working. One of these methods worked very well initially with systems that were web-based. As one panel member stated, "of course 'hits' were the initial measures of success. That's easy. But how do you measure improvement in…reduction in…completing routine tasks, level of

knowledge, etc?" A few panel members noted that they resorted to a user-comment form as a method of measurment, though expressed a belief that this was by no means an appropriate method.

Another common theme among the comments was the difficulty in establishing a baseline in order to measure future improvements. According to one member, "we did not have an objective performance baseline from which to measure improvements, and we have not done a very good job of 'instrumenting' our KM-enhanced process to capture performance-related improvements." Another member wrote, "main reason [for the difficulty measuring] is that we often don't know the total costs of today's methods/practices, therefore it is often difficult to demonstrate improvements."

A possible major obstacle in overcome some of these difficulties the panel identified is a lack of funding.

> "We are having trouble getting funding for KM, even though everyone expresses support for it, wants it and intuitively knows it will help them. Too many other wartime priorities. So for the money we can get, we need to prove its going to a good cause."

A similar issue was expressed by multiple panel members. The problem, however, is that accurate performance measures are needed in order to demonstrate success of the KM system. This in turn leads to appropriate funding. But funding is needed to properly develop a system of measurement:

"Even though the Intranet was a success, it was hard to quantify its success when it came time to defend it or obtain additional funding. In our terminology, it didn't "support the warfighter" so therefore was available for cutback, even though the majority of the workforce relied on it on a daily basis."

Appendix D contains a list of all of the comments provided by the panel members regarding difficulty measuring KM benefits.

Conclusion

The goal of this thesis was to answer three research questions, which were outlined in chapter one:

1) What does the literature identify as the key benefits of KM programs in general?
2) What do DoD KM experts identify as the key benefits associated with KM in the DoD?
3) Do DoD KM experts experience problems measuring KM benefits? If so, how?

Research Question One

Question one was designed to identify what KM benefits have already been identified in the literature. The literature review presented in Chapter 2 provided the answer to this question. In the early stages of KM practice, evidence of benefits were provided mostly through observation and anecdotal evidence. However, the North and Hornung (2003) study as well as the research done by KPMG Consulting (1999) was used to highlight KM benefits discovered through methodical research efforts. In addition, the balanced scorecard approach to KM benefits developed by Lopez and Raybourn of the APQC (2003) was used to categorize these benefits and help develop the methodology to answer research question two (Table 3.2).

Research Question Two

Question two was central to this research effort and designed to identify the particular KM benefits that apply specifically in a DoD context. This question was answered through the Delphi study, which used proven methodology to generate consensus or movement toward consensus regarding each benefit identified in research question one.

Six benefits presented to the Delphi experts achieved consensus after the first round, while nine of the ten remaining benefits showed a move toward consensus after the second round. One benefit failed to achieve either consensus or a move toward

consensus, thus its applicability to the DoD was not conclusively determined. Table 4.24 combines these items into a table outlining those items that the panel agreed were a benefit related to KM in the DoD.

Benefits related to KM in the DoD	Mean Rating
Time savings in doing routine work	4.09
Increased information content	4.27
Improved (employee) teamwork	3.91
Acceleration of processes	4.00
Re-use of internal knowledge	4.18
Increased (employee) motivation	3.82
Enhancement of personal knowledge	4.27

Table 4.24 – Benefits related to KM in the DoD identified by the Delphi panel

Research Question 3

Research question three was asked in response to the difficulty measuring KM benefits identified in the KM literature. Measuring the benefits of an initiative is essential in order to determine its applicability as well as candidacy for future efforts and funding. After identifying the benefits of KM from a DoD perspective, it seemed important to get an idea if the same difficulty measuring those benefits existed in the DoD as well.

This research question was answered through the open-ended question presented in Delphi questionnaire number two. All eleven panel members polled stated at least some degree of difficulty in measuring the benefits of their respective organization's KM initiates. Central to this problem was the difficulty in defining performance metrics that

actually measured the often intangible benefits that are provided by KM. Related to this issue was the difficulty in establishing a baseline for measuring KM improvement, though a baseline cannot be established until accurate measures are developed. Finally, lack of appropriate funding made it next to impossible to even begin to develop appropriate measures. Interestingly, members believed this funding would come when they could properly demonstrate the improvements provided via KM. However, without proper funding it is extremely difficult to develop the appropriate measures.

V. CONCLUSION AND RECOMMENDATIONS

Conclusions

This research effort shows that there are indeed some benefits being realized through KM practice in the DoD. While employment of the Delphi method worked to achieve consensus or movement toward consensus on many of the issues, the comments provided were equally important in providing insight into how KM is being applied in the DoD. Despite the fact that all items in the Delphi questionnaire were benefits that were actually being realized in the private sector, only 7 of the 16 items presented to the panel were seen as an actual benefit observed by KM experts in the DoD.

Of those seven items, three were under the *business process benefits* category and three were under the *benefits concerning employee satisfaction* category, while only one item under *benefits concerning customer satisfaction* was considered a benefit. Perhaps an explanation for the imbalance is provided by North and Hornung's discovery that the benefits derived from KM are dependent upon the KM approach taken (2003). Indeed, a review of the descriptions each panel member provided regarding the KM programs they oversaw indicated a tendency toward technology-based KM solutions. In other words, it seems that the DoD has at least initially applied KM through technology-based initiatives such as Communities of Practice and Knowledge Repositories. There wasn't a clear indication that these KM initiatives were being targeted toward specific business objectives, nor were the organizations trying to balance the necessary IT with proper management incentives. If the DoD would like to see a more balanced benefit from the

application of KM, perhaps it might consider using this more balanced approach. North and Hornung's study found that organizations using such a "professional KM" approach demonstrated robust benefits across all categories.

Still another explanation for the lack of realization of customer-related benefits could be culture-based. The DoD, especially the branches of the Armed Forces, tends to ignore the notion that it has "customers" in the classic sense. After all, customers are what profit-making businesses concern themselves with, and the DoD is not a profit-making business. This idea was expressed throughout the comments submitted under the *benefits concerning customer satisfaction* section, with one member stating, "…yes, we had many customers, some DoD organizations argue they don't." Perhaps DoD organizations looking to apply KM should not ignore the benefits such initiatives could provide in the area of customer satisfaction. However, these organizations first must recognize that they likely do have customers, and then must identify who these customers are.

Ultimately, the low scores on *improvements in product service and quality* as well as *increase in customer satisfaction* may indicate that KM in the DoD is still very internally focused. A fully KM-mature organization finds benefits both internal as well as external to the organization, and finds improvements across all business objectives as well as across organizational boundaries (Davenport & Prusak, 1998; Ehms & Langen, 2001; Nonaka & Takeuchi, 1995).

Another reason for so many items not being found beneficial could be because KM is still in its infancy in the DoD. This is reflected in several of the comments made

by panel members. These were mostly along the lines of, "we don't see that benefit yet, but we expect to once our initiative matures." Similarly, respondents made several references to the idea that a culture of knowledge sharing was not yet present in their organizations. As the KM literature shows, building a culture to support KM is essential for success, and such an effort takes quite a bit of time. The goal of this research was to identify KM benefits that are currently being realized. However, it is not safe to conclude that items that were not found to be beneficial under this research effort will not be benefits realized once DoD KM matures.

Finally, this research effort reiterated the notion that KM benefits are very difficult to measure, even in the DoD. Of course, measuring benefits first requires identification of those benefits. Hopefully the results of this research effort might be applied toward building a methodology to measure the benefits of KM in the DoD.

Perhaps a common theme tying all of these findings together is that KM in the DoD is still in its very early stages. Ehms and Lange's Knowledge Management Maturity Model (2001) can be used to assess how far an organization has progressed in taking advantage of all that KM has to offer. According to the model (Figure 5.1), the stages are defined as follows (Ehms & Langen, 2001):

1. Initial – KM activities are non-systematic and ad-hoc. No language for describing organizational phenomenon from a knowledge point of view.
2. Repeated - Pilot projects and single activities labeled as KM.

3. Defined - Standardized processes make creation, sharing, and usage of knowledge efficient.
4. Managed - Creation, sharing, and usage of knowledge is organizationally integrated and improved (measurement).
5. Optimizing – KM is developed and continuously self-organized.

Judging from the comments provided by the panel, it seems that DoD KM falls somewhere between the 'Repeated' and 'Defined' stages. It is clear that many organizations in the DoD are starting to adopt pilot KM projects and activities (Repeated KM), and are in the beginning stages of trying to standardize these processes within the

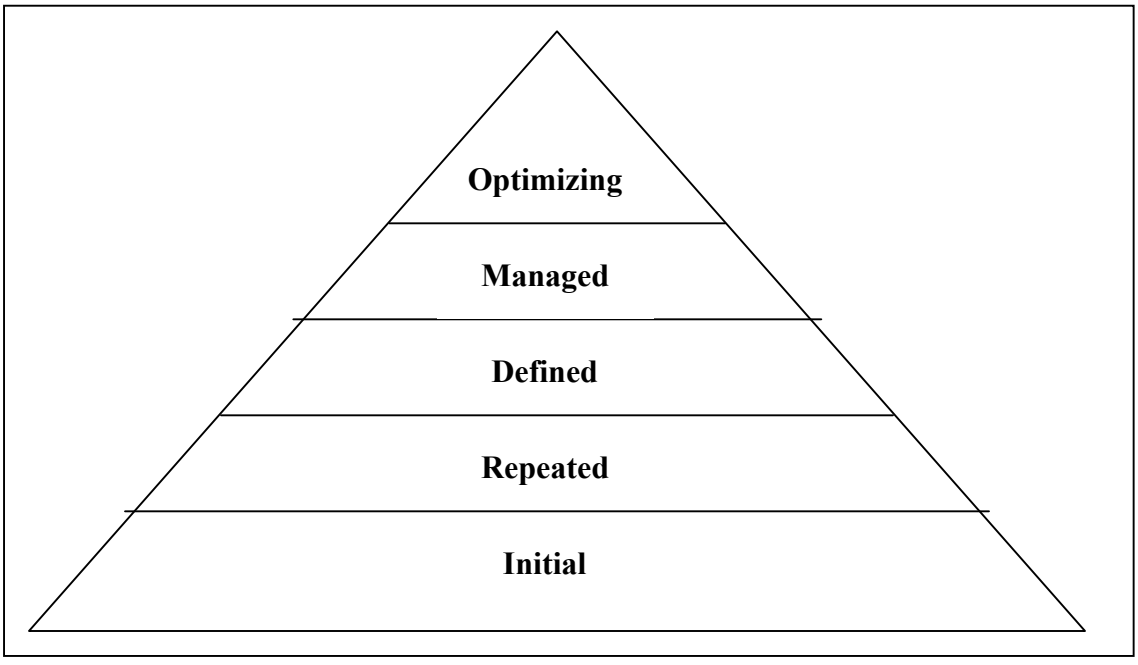


Figure 5.1 – Knowledge Management Maturity Model (Ehms & Langen, 2001)

organization (Defined KM). However, the DoD is still a long way from integrating these activities across entire organizations, which is no doubt hampered by its lack of ability to measure KM benefits (Managed). This ultimately limits the ability to obtain increased funding, which prevents the spread of KM throughout the organization.

Limitations

First and foremost, results of the Delphi method are not meant to be extrapolated out to larger population. The members of this Delphi panel were identified as experts using criteria developed by the researcher, and their responses reflect their educated opinions on the topic. The results of this study should be viewed as the consensus of a group of experts, and not scientific fact; they are entirely dependent on expert opinion, and should be seen as such.

Second, the answers of the Delphi panel are very subjective. While these individuals have been identified as experts, their opinions can differ by a wide margin. The Delphi method compensates for this by using multiple rounds to achieve consensus. However, due to time and manpower constraints, this study was limited to two rounds. Therefore, it was not possible to continue until consensus was reached on every item. While a movement toward consensus was observed for all but one item that did not achieve consensus, there were still some members whose opinion widely differed from the majority of the group.

In order to mitigate subjectivity, Delphi questions must be as clear as possible. However, comments related to the *increased information content* item suggest that the

majority of panel members viewed this item as it related to an overall organizational perspective rather than the customer perspective as intended. Also, the questionnaire failed to take into account and make a distinction between an internal vs. external customer perspective. This may have affected group response related to the customer benefits category.

Finally, despite the fact it seems some DoD organizations are further ahead than others in recognizing and applying KM, the practice overall is still in its infancy. The varying opinions of the Delphi panel members help illustrate this notion. However, research efforts such as this one will hopefully assist in moving toward a common blueprint regarding the application of KM across the DoD.

Recommendations for Future Research

Now that this research effort has provided a general idea of what a group of experts think are benefits of KM in the DoD, additional research should be done to validate this discovery. Follow-on research could use a more quantitative methodology to identify the benefits of KM. For example, a survey of a large population of KM implementers as well as users could be conducted. Ideally such a survey could be extrapolated to the entire population of DoD KM users, thus providing a more quantifiable measure of DoD KM benefits.

Further research could also be used to build a taxonomy for classifying the benefits of KM in the DoD as well as build a methodology for identifying those benefits needed in an organization before building a KM system. Murray (2002) believes it is

absolutely essential to identify the desired benefits of the application of KM before implementation.

Also, a more definitive list of the realized benefits of KM in the DoD could help develop a framework for measuring those benefits. This is an absolutely essential step in order to both justify current KM efforts as well as spark continued growth and application of KM in the DoD.

Finally, additional research is necessary to help develop an operational definition of KM as it applies to the DoD. As the literature review pointed out, finding a common definition for KM has continued to elude the academic community. However, one of the primary difficulties when conducting KM research is compensating for the diverse views regarding what exactly constitutes a KM practice. Developing an operational definition would not only solve this problem, but help solidify the distinction between knowledge and information management and build credibility for the practice as a whole. This is necessary for KM to progress beyond what some call "old wine in a new bottle" to fulfilling its potential as a key enabler in the continual transformation of the DoD.

APPENDIX A – Delphi Panel Participant List

Name	Position	Organization
Adkins, Randy	Chief, Workforce Development Branch	HQ AFMC/RDWD
Decker, Debbie	KM Collaboration	DISA KM
Houck, Dale (LtCol)	Commanding Officer	CSSD-36, 3D FSSG, III MEF (USMC)
McDonald, Doug	Division Chief	DISA CIO/COH
McHail, Rex	Program Manager, KM	DLA HQ, J-62
Morris, Rodler	Knowledge Architect	Army CIO / G-6, Enterprise Integration, Strategic Partnering
Schlag, Gretchen	KM Team Leader	Dept. of the Navy, CIO
Tefft, Robin (Col)	Chief	Army Medical Department Center and School, Department of Learning Innovation and Technology
Winkler, Gary	Principal Director, Enterprise Integration	HQDA, US Army CIO / G-6

APPENDIX B - Round 1 Delphi Questionnaire

Benefits of Knowledge Management in the Department of Defense Questionnaire (Part 1 of 2)

Instructions:

1. The following questionnaire consists of 17 short questions with room to add comments. Completion of this questionnaire should take no more than 15-20 minutes of your time.

2. Specific responses will be treated anonymously. However, each participant's name and organization will be included in a list of contributors unless he/she desires to be excluded. **Please identify below if you do not wish to be included**.

- I Do wish to be included on the list of contributors.

3. **When finished, please save the completed questionnaire as an MS Word document and e-mail back to me as an attachment at david.sasser@afit.edu.**

4. Please fill out the "Participant Information" section below and then scroll to the next page to begin the questionnaire.

Participant Information

Participant name:

Participant organization / office symbol:

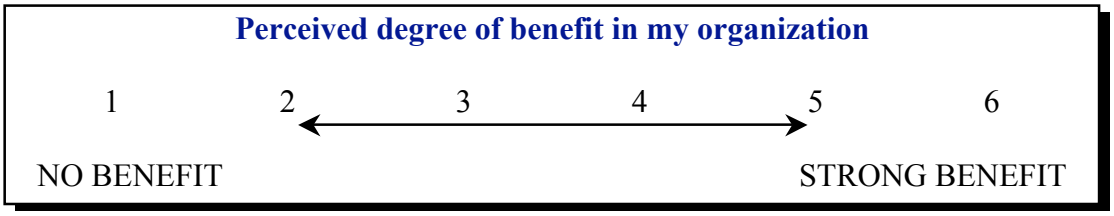
Position within organization:

Years working in organization:

Years experience working in knowledge management:

- Please review the list of knowledge management (KM) benefits below. For each item, consider the degree to which you perceive the application of KM in **your organization** has provided the benefit listed. Remember to consider each benefit's applicability to your organization only. The purpose of this study is to identify *realized* benefits of KM. Therefore, do not respond based upon how you *think* KM should benefit, rather respond only to how you have actually *witnessed* benefits within your organization.

- Please rate your perceived degree of benefit for each item on the six-point scale shown below.



- For each item you perceive as having a degree of benefit, please use the comments section to provide an explanation of how the benefit has translated within your organization. An example response is provided below.

Avoidance of redundancies	6
Comments: Before we implemented KM, when searching out a technical answer from our process experts we had to spend time re-discovering who exactly those experts were. Now with the CoP tool that we've implemented, personnel can easily find who the experts are under several pre-defined categories. They can even find answers to some of the most frequently asked questions immediately using the tool.	

- Space is provided at the end of this questionnaire to list any benefits you have observed that are not contained in the list below.

Recognized benefits of KM	**Perceived degree of benefit in my organization**
Business Process Benefits	
Acceleration of processes	1
Comments:	
Avoidance of redundancies	1
Comments:	
Re-use of internal knowledge	1
Comments:	
Reduction of errors	1
Comments:	
Time savings in doing routine work	1
Comments:	

Benefits concerning customer satisfaction	
Better response time	1
Comments:	
Improvements in product and service quality	1
Comments:	
Better customer communication	1
Comments:	
Increase in customer satisfaction	1
Comments:	
Better customer retention	1
Comments:	
Increased information content	1
Comments:	

Benefits concerning employee satisfaction	
Increased motivation	1
Comments:	
Improved teamwork	1
Comments:	
Shorter training periods	1
Comments:	
Development of job skill	1
Comments:	
Enhancement of personal knowledge	1
Comments:	

Please use the space below to outline any benefits you have observed in your organization that are not on the list above:

Thank you for completing this questionnaire. Please save the file and e-mail it as an attachment to david.sasser@afit.edu.

APPENDIX C - Round 2 Delphi Questionnaire

Benefits of Knowledge Management in the Department of Defense Questionnaire (Part 2 of 2)

Instructions:

1. Please read the following instructions before filling out this questionnaire. This questionnaire consists of three sections. The first section contains 10 KM benefits which did not meet a rating consensus among the group. The second section is an open-ended question regarding the measurement of KM benefits. The third section is for your information only and outlines the KM benefits that reached a rating consensus in the first round.

2. Consensus for round one was reached by applying the following measure:

   > 90% or more of all respondents' inputs fall within +/- 1 standard deviation (SD) of the group mean (SD's were rounded to the nearest whole number). Also, of the remaining 10%, no more than one (1) response had a conflicting overall opinion than the group response [i.e., all group responses but one fell within the 1-3 range (generally no benefit) or 4-6 range (generally a benefit)].

3. The rating system for this questionnaire is the same as the rating system used in round one.
   Each item includes the group mean response, your round one response, and a place for you to record your round two response. Use the drop down box provided to enter your original or new rating. Also review the next box to determine whether your rating differs from the general consensus. If so, please use the text box to provide an explanation.

4. Each item also includes a list of comments compiled from all panel member responses. Please review these comments as well as the group mean response before deciding whether to keep or change your round one response. A few additional minutes of your time to review your previous selection and either keep it or select a different response ensure accurate results of the Delphi method.

5. Section 2 features an open-ended question designed to identify any problems you may or may not experience measuring KM benefits to your organization. This will provide additional information for my data analysis.

6. Section 3 is provided FYI only so that you may see the mean rating for items that achieved consensus as well as comments from your fellow DOD knowledge management practitioners.

7. Please complete the questionnaire by 14 Dec 03, save as a Word file, and e-mail back to me as an attachment at david.sasser@afit.edu.

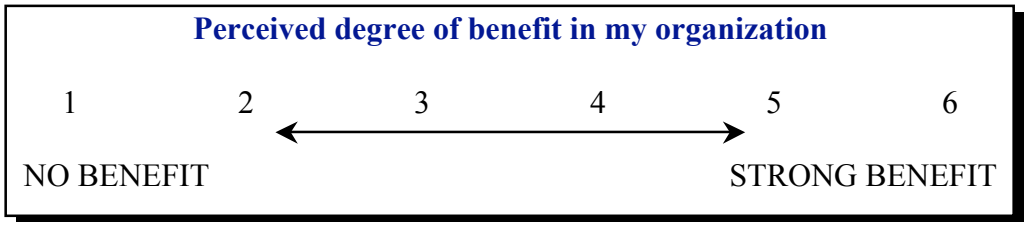
8. Before beginning, please take a quick moment to fill in the question below. A description of the general KM processes you are using in your organization will help with my analysis.

Please provide a brief description of the KM systems/programs/processes you are using in your organization:

SECTION 1

- Please review the following list of 10 knowledge management (KM) benefits below which didn't achieve a rating consensus in round one. For each item, review the group mean response as well as the comments provided by the group members. Then review your original rating and decided if you would like to keep or change your rating. Finally, if your rating differs according to the description provided, please provide a brief explanation why.

- Consider your rating based on the six-point scale shown below, which is the same as round one.



Recognized benefits of KM	Mean group rating	Your original rating	**Perceived degree of benefit in my organization**
Business Process Benefits			
1. Acceleration of processes	4		1
If your final rating is below 4, please explain:			

Group Comments:

- People can spend time producing the product instead of looking for information

- We have several in-house-developed programs for tracking programs and tasks that our customers say have saved them days each month (what they used to do manually)

- With the implementation of KM we have been able to automate and streamline several reporting processes. The data is more accuate and timely.

- In some cases, the use of KM tools merely "sped up the mess." That is, the tools merely automated a process that was not efficient in the first place.

- Under the umbrella of our KM initiative, we have undertaken steps to improve the information management of the agency (good KM requires sound IM foundation). We are moving away from Powerpoint-based methods for capturing and sharing information to database-driven approaches. In the process, we have automated processes that had previously been manually performed.

- We are in the early phases of implementation, so adoption of new practices and familiarity of supporting tools is still an issue.

- In the areas of serial and strategic knowledge transfer, the Army has done exceptionally well, with very effective use of action reviews and a lessons learned program that worked exceptionally well before 11 September. On the other hand, the Army is only at the beginning of using fundamental KM approaches to transform most of its central business processes.

- For the processes that have successfully used KM techniques, the payoff is very high. When we consider the percentage of the enterprise that have enabled their business using KM, the benefit is lower.

- People don't use km processes enough to fully take advantage of them..it's a culture issue.

2. Re-use of internal knowledge	4		1

If your final rating is below 4, please explain:

Group Comments:

- Gradually people are getting used to our one stop shop concept for our KM Portal

- For those items we are capturing and sharing we are seeing an increase in the re-use of knowledge and best practices.

- One of the more significant benefits of KM. We now had mechanisms that made it much easier to capture, store, access and most importantly, reuse, information/knowledge. The most difficult aspect to overcome was getting people to contribute. KM does not seem to flourish unless tied to performance appraisals.

- Easier for other teams and working groups within the teams to see what others are doing. Have observed several instances where groups re-used what others had done, where before they would have created something similar but slightly different without a KM system.

- Now that we are beginning to capture data that had previously been located in filing cabinets, PC hard drives, etc. and storing it in centralized databases, we are able to reuse information to satisfy different reporting requirements.

- I think we do well in this area. We are documenting processes, posting them for easy access, and providing subject matter experts as contact points.

- The Army led the way in managing explicit knowledge, and has perhaps the global best practice in tacit to explicit knowledge exchange in its CompanyCommand.mil and its lessons learned program, although fusion of legacy lessons larned with new structures like communities of practice and virtual teams is just underway in terms of serious institutionalization. Given the exceptional demands of an organization in transformation and at war, much needs to be done to mature as a learning orgnaization, and to launch as a teaching organization.

- Sharing lessons learned is theoretically useful, but no specific information is available to show that people use this to improve their mission.

Benefits concerning customer satisfaction

3. Better response time	3		1

If your final rating is above 3, please explain:

Group Comments:

- One guard unit deploying overseas indicated the CoP saved them significant time in getting up to

speed

- We are very customer focused and trying to improve our response time with internal process improvements and prioritization of work.

- Feedback has been positive. Customers are seeing their requirements implemented in a more timely manner.

- Our KM initiative is focused on the internal information and knowledge sharing needs of the Agency. Therefore, the benefits do not accrue to our customers except for VERY indirectly.

- Fileding our coming Battle Command Knowledge System (BCKS) will transform this into our greatest strength in the next two years.

- Judicious use of KM has shown significant reduction in cycle time for those organizations that understand how to implement it effectively. Once again, this improvement is seen on a case-by-case basis, not enterprise-wide.

- Customers can help themselves better..don't have to rely as much on others..they feel more in control

4. Improvements in product and service quality	3		1
If your final rating is above 3, please explain:			

Group Comments:

- Some CoPs are better able to provide new services as those are shared across the community

- Nothing existed before so we have the advantage of having new products for the customer

- Bringing visibility to data has improved quality.

- Consistency through re-use, with opportunities to learn from earlier experiences

- The BCKS will transform this as well, but meanwhile our development of TTPs, doctrine and training materials, and materiel acquistion leave much to be desired.

- Better information is obtained to facilitate actions

5. Better customer communication	3		1
If your final rating is above 3, please explain:			

Group Comments:

- Our customers are happy with our communication and our desire to serve them better

- Almost immediate. Requirements and feedback times have improved.

- Not sure the KM system really improved the overall product to the 'customer', however it did make it easier to develop that product.

- Collaboration and deliberate establishment of Communities of Practice have already begun to be appreciated.

- Connetivity between what the fighting Army needs and what the institutional Army provides is broken, although we believe that BCKS will fix this too.

- Faster response time to questions

6. Increase in customer satisfaction	3		1
If your final rating is above 3, please explain:			

Group Comments:

- We're still pretty new so it's hard to say but I don't think our satisfaction rate is decreasing

- Our customers are talking about our new capabilities and improved level of service.

- I have no evidence to support an increase in customer satisfaction or retention (yes, we had many customers, some DOD organizations argue they don't). While I am sure that employees were able to find needed information more quickly and work more efficiently, I cannot be sure what correlation it had in terms of customer support. The benefits of knowledge sharing are of little use if they can't be translated the "last tactical mile" to the customer.

- Jury is still out, but most people anticipate good improvements in this area are nearly here.

- Customers see potential improvements coming from entral KM initiatives, and thus we are reaping customer satisfaction in advance.

- Product quality, service and response time increases lead to better customer satisfaction

Benefits concerning employee satisfaction

7. Increased motivation	4		1
If your final rating is below 4, please explain:			

Group Comments:

- This is hard to answer. Internally, our support staff feels job satisfaction but as an organization, I think that we've made people's jobs easier so I would think that increases their motivation to use the KM tools and to pursue other efforts since they've saved time due to KM.

- Employees get almost immediate feedback.

- My personal satisfaction increased as more information became available to me. I felt more "in tune" with the direction and daily events occurring within the command, very difficult to do before the advent of the Intranet and KM principles.

- Those that took the time to use it really liked it, but there are still those who feel they are too busy to sit down and learn even though they agree it will improve their work.

- Employees seem to recognize that the intiatives that we have selected to date provide value and

believe that we are on the right track. To this extent, our work is positive. I cannot say that it alone has made a significant contribution to improving motivation. **-** Most employees who are involved with our KM efforts have been most enthusiastic. They see the values. They generally want to share knowledge. - We have not yet fielded the nested network of CoPs and the methods of the teaching organization, with its interactive knowledge creation woven into the fabric of daily decision making and performance, likely to push us past the tipping point here.			
8. Shorter training periods	3		1
If your final rating is above 3, please explain:			
Group Comments: **-** Since we implemented standards and common user interface, we have seen a decrease in the number of training requests and help desk calls. **-** Those that took the time to learn adapted to the system quickly. Even though we provided hands-on instruction and full-time desk-side assistance, there are still a minority who feel they are just too busy to learn a better way of doing things. - To the extent that our centralized repositories of information are available for future reference (e.g., for new employees), it is easier for folks to find what they need in order to get up to speed on new projects to which they have been assigned. However, learning new jobs requires a richer set of knowledge that is usually contextually unique. We have addressed overarching information and knowledge needs of the Agency, not the specific training needs of individual positions. - The Army is only now beginning to apply contemporary KM to its training cycle. BCKS is the key. - People get up to speed faster			
9. Development of job skill	3		1
If your final rating is above 3, please explain:			
Group Comments: **-** We've definitely made this easier for the organization. They can manage their efforts better and easier, and integrate results all at the touch of a key. We're helping everyone develop better management/job skills **-** Have not seen much in this area. We have created links to knowledge that historically has not been readily available. - learning a new way of thinking about developing products and staffing documents has opened people's mind about the possibility. Some users found new and advanced ways of employing the system, beyond the basic set of capabailities and processes that we anticipated. - Our initial efforts have focused more on information management than pure knowledge management. We are now just beginning to tackle the hard problem of sharing tacit knowledge, so I would not say that we have yet significantly enhanced job skills with our existing initiatives (which are mostly dealing with explicit knowledge). **-** rudimentary except in those few areas with -rate CoPs, like Company Command. - more info, more knowledge is passed between people			
10. Enhancement of personal knowledge	4		1

If your final rating is below 4, please explain:

Group Comments:

- Probably the biggest plus.. the cross functional sharing of knowledge across the organization.. the beginning of real cultural change towards open communication and knowledge sharing.

- Our field sites are more engaged with headquarters and more aware of current status of products and services.

- Probably the single best benefit to the workforce. People's awareness of upcoming events, training, references, how-to's, etc. was at a level never before seen in the command (an acquisition command). As a result, seemed to be better informed than ever. In fact, when attempts were made to scale by certain portions of the Intranet, there was a hue and cry to keep all functions in place. The saying "you don't know what you've got until it's gone" applies to useful information and KM in general.

- Our initial efforts have focused more on information management than pure knowledge management. We are now just beginning to tackle the hard problem of sharing tacit knowledge, so I would not say that we have yet significantly enhanced personal knowledge.

- Those directly involved with the KM efforts sre, in my opinion, deriving lots of benefit already. Enterprise-wide, we are hopeful, but can't claim wide-spread acceptance yet.

- The BCKS will revolutonize this area, with the nested network of CoPs central to self-development and lifelong learning. Right now self-development is "tooth-pick thin."

- The availability of relevant information provides extraordinary enhancement of knowledge. The challenge is to make knowledge available easily and quickly.

- Only limited by the proactiveness of the individual

SECTION 2

Open ended question regarding measuring KM benefits.

Do you experience problems measuring KM benefits to your organization? Please explain:

SECTION 3

This section provided FYI. These are the six items that achieved a rating consensus in round one, along with comments from the group.

Recognized benefits of KM	Mean group rating
1. Avoidance of redundancies	3 (generally regarded as no benefit)

Group Comments:

- People can spend time on producing the product instead of looking for information

- We are still trying to integrate most things so we're not there yet.

- We have made improvements in this area, however since we are still in the pilot phase of our implementation, some redundancy still exists. However as more and more people become aware and comfortable with the new tools/capabilities, they are becoming more comfortable with moving away from their manual/redundant processes.

- Due to re-use of knowledge, there has been some reduction in redundancies

- We have not yet eliminated redundancies, but we expect to as part of our process. Our emphasis is on identifying authoritative sources of data and using them. All of our new capabilities have been built on existing systems (when appropriate). Thus, we have not added new redundancies. Eliminating redundancies will follow.

- We have a fairly active KM "Working IPT" that has begun the culture change in this area I think. Associations among WIPT members seems to have encouraged knowledge exchange and reduction of some need to "invent it here".

- The Army Concept Based Requirements System (CBRS) made the Army a pioneer in knowledge-based developments, but the system withered after 1993, without systematic use being made of newer KM structures like Communities of Practice. Modular, object-based developments based on effective knowledge representation is only in its infancy.

- The potential exists, but I don't think KM is sufficiently embedded for people to maximize its use.

2. Reduction of errors	3 (generally regarded as no benefit)

Group Comments:

- Menu driven reduces erros and automatic charts from data reduces errors

- Because we are still a pilot, not sure if we are seeing a true reduction in errors at this time. However we have seen that errors are identified earlier on in the process before becoming an issue.

- I cannot say that excessive errors were something that we found to be a problem. Therefore, we have not found it necessary to develop associated strategies or initiatives to combat errors.

- As we re-use internal knowledge more effectively, errors naturally decline.

- The Army pioneered globally both After Action Reviews and strategic organizational learning, with a profound reduction in errors within leader teams, and by other leader teams making the same mistake as their predecessors. Slow implementation of cutting-edge KM processes, structures, tools and mindsets has hampered our potential for reducing errors.

3. Time savings in doing routine work	4 (generally regarded as a benefit)

Group Comments:

- Our CoPs tell us they are saving 8 hours a week thought the CoP

- So far this is the biggest plus for KM. Not only is data entered once, it creates multiple reports and charts so those no longer have to be done manually

- Have seen a direct correlation to time savings and senior leadership buy-in to the new and improved processes. If the senior leadership is on board, their staffs will utilize the new tools. Several manual processes have been automated which have resulted in time savings. Information is able to be gathered and assembled more quickly.

- Again, the precepts of KM proved significant in terms of routine work. A well-designed Intranet was crucial to making information easier to find and allowing employees to complete routine tasks in less time thereby freeing more time for them to focus on more important matters (or so the theory goes). Routine items such as scheduling conference rooms and completing leave requests were placed on the intranet where they were accessible by all and easily completed. These are just two examples of items that saved time. Some would state that this is not an example of KM in action. However, it's all relative, even knowing the owner/scheduler of a conference room is can be important to the person tasked with scheduling its use.

- Gave the integration the ability to put together their required daily briefings much faster. Before they had to wait on each team to send an e-mail with the latest file attached. there was often confusion as to which attachement was the latest version. Then the integration team had to review all the daily presentations and eliminate redundancies and try to synchronize the input. Now the KM system provides version control and a way for others to review it and then post comments, so it is a collaborative review process.

- Some of our new applications have saved a tremendous amont of manual labor.

- Not a lot yet, but we anticipate big progress soon. We are now implementing what we cal "DLA eWorkplace" which embodies many KM capabilities via an enterprise portal. This will enable much quicker access to various types of knowledge resources, in a much easier way, and it provides for active employee contribution through collaboration, shared libraries, and more. Releases of incremental versions of DLA eWorkplace have already begun with small test communities, and will be made available enterprise-wide by next month.

- Our best practices have shown dramatic time savins. The prime community of practice (CoP), CompanyCommand.mil, saves as much as 30 percent for active participants. While we have a state-of-the-art plan for networking the force with structured CoPs, it has not yet been implemented. Thus, our impact on time savings is limited to fragments of the force.

- Automating and web-enabling the business process saves significant time. Once again, it is succesful in portions of our business, but has not matured to the enterprise level.

4. Better customer retention	2 (generally regarded as no benefit)

Group Comments:

- Hmmm, I never considered whether or not we should retain our customers! Let's just say that more customers come to us as we integrate our portal services and we haven't lost any except to normal attrition (retirement, reassignments, etc.)

- We see a daily increase in the number of requests to participate in our pilot.

- Our focus is internal. As we make knowledge resources easier to reach and more dependable

for DLA employees, they will continue to find our methods and support tools worth choosing.

- Viewing the soldier in the field as our prime customer, we have great issues, due to strain put on them and their families by the current war, and the lack of responsiveness relative to the need.

5. Increased information content	4 (generally regarded as a benefit)

Group Comments:

- Our KM services increase every day and our information content increases and gets better every day.

- New content is being populated daily. Content Managers are working together to share lessons learned and develop/enhance guidelines.

- The amount of information growth was phenomenal after the initial standup of the Intranet. COP's were more difficult to standup and populate. As employees began to realized there was a single source of reliable information they could count on, they too began to contribute. This leads to an issue that was of concern. Information quality can be an issue. Data owners/Knowledge Center Mangers were needed to reduce or eliminate invalidated or poor quality information. But these tend to be your brightest and busiest people. Convincing them to expend the effort was difficult, even for those who understood the long-term benefits. The human factor (i.e. INCENTIVES) are crucial to obtain support for KM!

- We have no lack of content. The challenge is organizing and serving it up in a meaningful way.

- This is a hard one, since information content has exploded by, and this is just a guess, over fifty percent increase per year. However, without effective knowledge representation, an ubiquitous nested network of CoPs, or a systematic approach to upgrading data and information to actionable knowledge and genuine understanding, we have increased our ability to handle information only marginally, perhaps (again, a guess), by around three percent per annum. The result is marginal increase in usable information content. The BCKS may fix this to a consdierable degree.

- We are in content overload. If the question is about the quantity of content available, the availability is high. If we evaluate the ease of finding and retrieving content, that is a bit more problematic.

- there is plenty of content..the challenge is quickly finding what you are looking for

6. Improved teamwork	4 (generally regarded as a benefit)

Group Comments:

- Organizationally, we're working more cross functionally. Internally, we're definitely experiencing teamwork

- Organizational cooperation has increased since we implemented our pilot.

- Great improvement in ability of integration team to manage the 7 different groups developing products. more cross-fertilization and synchronization of the outcomes.

- Our applications respect the needs that teams have to keep certain information "close hold" within the team, while also allowing for the sharing of that information to a broader audience. To that extent, we are supporting team work and not undermining it by making sharing mandatory.

- Mixed bag. The potential is strong. Earlier adopters are already good team players and very productive. There are also laggers that find knowledge sharing to be threatening to individual gains.

- Virtual teaming with its tools, mindsets, structures, processes and high-performance end state is just underway, although the Army legacy approaches are very powerful here. Army teamwork is excellent, KM's impact on it rudimentary as of yet.

- We have used online collaboration very effectively to improve teamwork and knowledge sharing

- People are less dependent on others, so they tend to talk less to co-workers..this is not good

Thank you for completing this questionnaire. Please save the file and e-mail it as an attachment to david.sasser@afit.edu.

APPENDIX D – Member Comments Regarding Difficulty of Measuring Benefits

- Yes. The traditional expectations for measuring benefits place less value on the intrinsic benefits of knowledge sharing. Most of the senior leadership developed their skills and style with a clear understanding of this traditional model. Our challenge is to make the translation apparent.

- Yes. We did not have an objective performance baseline from which to measure improvements, and we have not done a very good job of "instrumenting" our KM-enhanced processes to capture performance-related improvements. Further, our portal is not yet instrumented to capture specific usage information, which might help us better understand how our various appliations are being used (or not). Therefore, it appears that the best we can do at the time is use the measure of "user satisfaction" as a surrogate for information system success, and we are deploying surveys to collect benefit information from a personal perpective. Based on the results of your research, we may tailor our survey to address benefits areas that we may have overlooked.

- Our organization is just getting started in this area. Previously, Km initaitvies sprouted all over the place--many poorly planned, on non-standard tools, and without real thought as to what the organization really expected from it. The problem is--and I suspect many government, or at least DoD, organizations are in the same boat--we don't know what the baseline is, so it's hard to quantify improvement/benefit. Much of the value of KM is found in intangibles or things we don't measure well--time saved (unless you are a contractor on the clock, government time is considered 'free and paid for'); money saved--(most cost savings come from eliminating jobs that used to do a task, but we generally don't eliminate jobs in the government). KM is probably more accurately measured in terms of anecdotal stories--it used to take me x hours to do this and I've cut my time in half (a perception, feeling, not a validated clock time). People feel more empowered when they know what else is going on in their area, but hard to quantify that feeling. We are just now incorporating a Return on Value basis for new KM projects. Folks will have to establish what type of improvements they think the system will give them--quantifying it if they can (such as reduce access time to necessary documents by 50%) and then follow up with quantifiable or anecdotal evidence that indicates if the initiative really hit its mark. We are having trouble getting funding for KM, even though everyone expresses support for it, wants it and intuitively knows it will help them. Too many other wartime priorities. So for the money we can get, we need to prove its going to a good cause. I'm convinced if we can have some performance measures that show benefit to the organization we will have a stronger case to compete in the funding battle.

- Absolutely. Most enterprises operate within a cultural framework that encourages and rewards competition & individual achievement. KM demands a shift to a culture where collaboration, knowledge sharing, and achievement are valued with competition and individual achievement. By nature, people will not share and that includes knowledge. Knowledge, no matter how trivial, is something to be hoarded as a sign of strength. To share is often seen as enhancing the posture of another with no perceived benefit. This was by far the biggest obstacle to overcome. Developing performance measures was just as difficult. Even though the Intranet was a success, it was hard to quantify its success when it came time to defend it or obtain additional funding. In our terminology, it didn't "support the warfighter" so therefore was available for cutback, even though the majority of the workforce relied on it on a daily basis. The difficult came in defining performance measures. Of course "hits" were the initial measures of success. That's easy. but how to you measure improvement in , reduction in completing routine tasks, level of knowledge, etc? In the end (by the time I departed as CIO), we never did develop quality performance measures.

- Somewhat. Main reason is that we often don't know the total costs of today's methods/practices, therefore is often difficult to demonstrate improvements. We are able to capture detail metrics for users who access our internal tools; however it is often hard to measure the value of a particular piece of information/knowledge. To date, we have not been able to develop good tacit knowledge measures.

- We're still in our infancy on this. We're getting ready to implement a KM Awards program where we measure certain usage and reward people for their use, innovation, and knowledge sharing. Too early to tell on this and other measurements. Currently we track usage in various forms (site entry, content update, etc.)

- Measuring specific benefits requires resources to baseline the current process and then implement the new process and measure the changes. It requires dedicated resources to accomplish this type of analysis that we just do not have. However, we do survey our users on a regular basis on the benefits.

- Yes. We have an Army Knowledge Implementation Plan with specified tasks and actions for Army organizations but are just now starting to define metrics, collect them, and analyze them. Most difficult of all is to measure the effectiveness of knowledge management tools and processes for the war-fighter or war-fighting mission. Our goal is to develop agile and adaptive soldiers, leaders, and units, but how to measure that adaptability and agility is still being wrestled with.

- Yes. The benefits are indirect, and therfore difficult to measure. There are many intervening variables that contribute to the success of a project/mission that it is difficult to determine the contribution of KM to the success. Currently our measurements are process such as frequency of access. We have instituted an evaluation of each knowledge product by the users, but have not measured the impact of this.

- Definitely hard to measure KM benefits and working in the DoD management is interested in the ROI. We are currently trying to define metrics that will help answer those questions. Working in the combined area of BPR and KM the metrics are going to be easier to identify.

- Yes, but more as a function of resources than a lack of a concept of how to do it. Measurement must be part of a funded, well-thought out management and measurement plan and draw on the behavioral and cognitive sciences, and knowledge economics and audits. We have a good general concept for executing ongoing measurement of return on value and investment. But, the funding is working rather than assured.

APPENDIX E - Delphi Analysis Spreadsheet

Round 1																
	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Item 15	Item 16
Panel Member 1	6	6	6	5	6	6	6	3	3	1	6	6	6	6	6	6
Panel Member 2	6	3	4	4	6	4	5	5	4	5	6	5	6	3	5	6
Panel Member 3	5	3	5	4	6	5	5	4	4	3	6	5	6	4	3	6
Panel Member 4	4	4	5	4	5	4	3	3	2	2	5	4	3	4	3	6
Panel Member 5	2	3	5	2	4	3	3	1	3	1	3	3	5	2	4	5
Panel Member 6	5	2	4	1	4	1	1	1	1	1	1	3	3	2	2	2
Panel Member 7	2	3	5	5	2	2	3	5	2	2	6	5	3	2	2	3
Panel Member 8	3	2	3	3	2	2	2	2	3	2	2	2	2	2	2	2
Panel Member 9	5	3	2	3	5	5	1	1	1	1	6	1	5	1	1	6
Panel Member 10	3	3	2	2	2	2	2	2	2	2	2	2	2	3	2	2
Panel Member 11	3	3	3	3	3	4	4	4	4	4	4	4	2	4	4	4
Mean	4.00	3.18	4.00	3.27	4.09	3.45	3.18	2.82	2.64	2.18	4.27	3.64	3.91	3.00	3.09	4.36
StDev	1.48	1.08	1.34	1.27	1.64	1.57	1.66	1.54	1.12	1.33	1.95	1.57	1.70	1.41	1.51	1.80
UpperB	5.48	4.26	5.34	4.54	5.73	5.03	4.84	4.36	3.76	3.51	6.23	5.20	5.61	4.41	4.60	6.17
LowerB	2.52	2.10	2.66	2.00	2.45	1.88	1.52	1.28	1.52	0.85	2.32	2.07	2.21	1.59	1.58	2.56
Consensus?		YES		YES	YES					YES	YES		YES			
Round 2																
Panel Member 1	6		6			6	6	6	3			6		6	6	6
Panel Member 2	5		4			4	3	3	4			4		3	5	5
Panel Member 3	5		5			4	5	3	3			5		3	3	5
Panel Member 4	4		5			4	3	3	2			4		4	3	5
Panel Member 5	2		4			3	3	2	2			3		2	3	5
Panel Member 6	5		4			1	1	1	1			3		2	2	2
Panel Member 7	2		5			2	3	5	2			5		2	2	3
Panel Member 8	3		3			2	2	3	2			2		2	2	2
Panel Member 9	5		4			5	1	3	2			4		6	3	6
Panel Member 10	3		2			2	2	2	2			2		3	2	4
Panel Member 11	4		4			3	3	3	3			4		3	3	4
Mean	4.00		4.18			3.27	2.91	3.09	2.36			3.82		3.27	3.09	4.27
StDev	1.34		1.08			1.49	1.51	1.38	0.81			1.25		1.49	1.30	1.42
UpperB	5.34		5.26			4.76	4.42	4.47	3.17			5.07		4.76	4.39	5.69
LowerB	2.66		3.10			1.78	1.40	1.72	1.55			2.57		1.78	1.79	2.85
Decrease in StDev?	Yes		Yes			Yes	Yes	Yes	Yes			Yes		No	Yes	Yes
Benefit?	Yes	No	Yes	No	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No	Yes

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14. ABSTRACT

Knowledge Management (KM) has been identified as one of several enablers of the current Transformation effort in the Department of Defense. Several organizations within the DoD have started using KM and are now interested in identifying and, subsequently, measuring the benefits in order to gauge success. While many studies have been undertaken to identify the benefits of KM in the commercial sector, similar efforts to investigate the benefits in a DoD context are lacking. Using a Delphi study involving key DoD KM experts, this research aims to identify the major realized benefits associated with KM practice from a strictly DoD perspective.

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